Medical Coverage Policy

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Treatment of Cutaneous and/or Deep Tissue Hemangioma, Port Wine Stain and Other Vascular Lesions

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INSTRUCTIONS FOR USE

The following Coverage Policy applies to health benefit plans administered by Cigna Companies. Certain Cigna Companies and/or lines of business only provide utilization review services to clients and do not make coverage determinations. References to standard benefit plan language and coverage determinations do not apply to those clients. Coverage Policies are intended to provide guidance in interpreting certain standard benefit plans administered by Cigna Companies. Please note, the terms of a customer's particular benefit plan document [Group Service Agreement, Evidence of Coverage, Certificate of Coverage, Summary Plan Description (SPD) or similar plan document] may differ significantly from the standard benefit plans upon which these Coverage Policies are based. For example, a customer's benefit plan document may contain a specific exclusion related to a topic addressed in a Coverage Policy. In the event of a conflict, a customer's benefit plan document always supersedes the information in the Coverage Policies. In the absence of a controlling federal or state coverage mandate, benefits are ultimately determined by the terms of the applicable benefit plan document. Coverage determinations in each specific instance require consideration of 1) the terms of the applicable benefit plan document in effect on the date of service; 2) any applicable laws/regulations; 3) any relevant collateral source materials including Coverage Policies and; 4) the specific facts of the particular situation. Each coverage request should be reviewed on its own merits. Medical directors are expected to exercise clinical judgment where appropriate and have discretion in making individual coverage determinations. Where coverage for care or services does not depend on specific circumstances, reimbursement will only be provided if a requested service(s) is submitted in accordance with the relevant criteria outlined in the applicable Coverage Policy, including covered diagnosis and/or procedure code(s).

Reimbursement is not allowed for services when billed for conditions or diagnoses that are not covered under this Coverage Policy (see "Coding Information" below). When billing, providers must use the most appropriate codes as of the effective date of the submission. Claims submitted for services that are not accompanied by covered code(s) under the applicable Coverage Policy will be denied as not covered. Coverage Policies relate exclusively to the administration of health benefit plans. Coverage Policies are not recommendations for treatment and should never be used as treatment guidelines. In certain markets, delegated vendor guidelines may be used to support medical necessity and other coverage determinations.

Overview

This Coverage Policy addresses the treatment of cutaneous and/or deep tissue hemangioma, port wine stain and other vascular lesions.

Coverage Policy

Coverage for the treatment of a cutaneous hemangioma, port wine stain, or other vascular lesion varies across plans. Refer to the customer's benefit plan document for coverage details.

If coverage is available for treatment of a cutaneous and/or deep tissue hemangioma, port wine stain, or other vascular lesion, the following conditions of coverage apply.

Laser destruction (CPT codes 17106, 17107, 17108) of cutaneous vascular* lesions is considered medically necessary for ANY of the following:

- port wine stain on the face and/or neck
- port wine stain on the trunk or extremities associated with recurrent bleeding or painful nodules
- cutaneous and/or deep hemangioma or other vascular malformation (e.g., venous, arteriovenous, lymphatic) and EITHER of the following indications:
  - the lesion is affecting a vital structure (e.g., nose, eyes, ears, lips, or larynx)
  - the lesion results in **ANY** of the following:
    - bleeding
    - eating difficulty
    - pain
    - repeated infection
    - swallowing difficulty
    - ulceration

***Please Note:** Reference Cigna Medical Coverage Policy 0328 Scar Revision for information regarding treatment of hypertrophic scar (i.e., non-vascular lesion) using laser therapy (e.g., CPT codes 17110, 17111).

Laser destruction (CPT codes 17106, 17107, 17108) of cutaneous vascular lesions for ANY other indication is considered cosmetic and not medically necessary.

INPATIENT HOSPITALIZATION

Inpatient hospitalization of an infant for administration of oral propranolol for the treatment of cutaneous and/or deep tissue hemangioma is considered medically

necessary when the lesion is ulcerated or affecting a vital structure (e.g., nose, eyes, ears, lips, larynx) and the infant is either of the following:

- age 8 weeks or less
- age 9 weeks to 12 months with ANY of the following:
  - lack of social support for home monitoring
  - presence of comorbid cardiovascular or respiratory conditions
  - presence of a comorbid condition affecting glucose levels

Health Equity Considerations

Health disparities related specifically to conditions such as port wine stains, hemangiomas or other cutaneous vascular lesions have not been well-studied in the peer-reviewed literature. The authors of a single study evaluated disparities related to healthcare access for children with infantile hemangioma (Lie, et al., 2018). This group of authors reviewed race/ethnicity, socioeconomic (SE) status, and associated age of presentation to a subspecialist (e.g., dermatology, surgery, ophthalmology) for children with complicated infantile hemangiomas. The study was a retrospective cohort involving 804 children who presented at a large academic hospital for evaluation and treatment. The primary outcome of the study was age at initial presentation, defined as early presentation (prior to age 3 months), delayed (three months to six months) or late (after six months of age). The outcomes of the study indicate mean age at presentation was 1.9 months, 4.3 months, and 21.1 months of age respectively for early, delayed and late evaluation. Low SE status was associated with delayed or late presentation; the early-presenting group (prior to 3 months age) had a greater proportion of children with higher-socioeconomic status (early 83.1% vs. delayed 73.2% vs. late 76.1%, p=0.030). No differences were found when evaluating gender, race, ethnicity or distance to nearest specialty clinic. Clinically, children with increasing severity scores and those having more than one lesion had higher odds of presenting early. Additional clinical studies are needed to evaluate health disparities for individuals with hemangioma, port wine, and other vascular type lesions.

General Background

Vascular lesions may be classified into two main categories: vascular tumors and vascular malformations. Vascular tumors are characterized by vascular endothelial cell hyperplasia and spontaneous involution. The most common vascular tumors are hemangiomas.

Vascular malformations are abnormalities in blood vessel formation; these lesions do not regress and slowly enlarge. The name of the malformation reflects the blood vessel forming the lesion: capillary, venous, arterial or lymphatic. A common capillary malformation, the port wine stain, is characterized by flattened endothelial cells with normal turnover. Venous malformations give a bluish color to the area under the involved skin or mucosa. Arterial malformations are rare, are often referred to as arteriovenous malformations and are direct connections of arteries to veins. Lymphatic malformations can involve either large (cystic hygroma) or small vessels (lymphangioma circumscriptum). A fibro-adipose vascular anomaly (FAVA) is an anomaly in which fibrous fatty tissue replaces muscle tissue and becomes intertwined with veins and/or lymphatic vessels. Vascular malformations can also consist of combinations, such as with Klippel-Trenaunay Syndrome or Sturge-Weber Syndrome.

Some vascular lesions have potential to result in permanent disfigurement with the main goal of treatment aimed at improving cosmesis. Vascular lesions may also interfere with functioning of vital structures, and/or result in symptoms, such as pain, ulceration and bleeding. Generally,

treatments are dependent on the type of lesion and lesion severity, but typically include the following procedures, which may be performed alone or in combination:

- injectable medications (e.g., corticosteroids)
- laser therapy
- sclerosant therapy
- surgical debulking, with or without compression garments
- radiotherapy

Cutaneous/Deep Tissue Hemangiomas

Cutaneous hemangiomas occur in approximately 1 out of 10 children; these lesions are characterized by rapid proliferation in early infancy and slow involution that may occur over several years. The mechanisms that control involution are not well understood. Some hemangiomas are present at birth as precursor lesions; rarely are they fully formed tumors at birth. More commonly, lesions become evident after birth, usually within two to four weeks. Hemangiomas frequently occur on the face and neck area but may also be located on areas such as the trunk and/or on internal organs. Most hemangiomas do not require medical intervention, although some may cause functional complications or disfigurement. Areas that are frequently associated with complications include the periocular region, lip, nasal tip, beard, and face (Marcdante, et. al., 2023).

Two types of congenital hemangiomas have been described in the literature and include those that are rapidly involuting, and those that are noninvoluting. Kasabach-Merritt syndrome is a complication of rapidly enlarging vascular lesions (hemangioma) and is characterized by hemolytic anemia, thrombocytopenia and coagulopathy. While these lesions are not hemangiomas of infancy, they result from a more aggressive proliferative vascular tumor that results in decreased platelets and other bleeding problems. Although the syndrome is rare it requires aggressive treatment and is often associated with a high mortality rate.

For a majority of hemangiomas no intervention is needed and lesions regress spontaneously. Some lesions result in untoward cosmetic changes that have no clinical significance. Although infantile hemangiomas involute, involution may be incomplete with resulting permanent skin changes that may be life altering, particularly for lesions that are thick (Krowchuk, et al., 2019). Complications resulting from hemangiomas have been reported and are often related to the site of occurrence, with approximately 10-20% requiring treatment due to complications (Satterfield, et al., 2019). The most frequent complication associated with hemangiomas is ulceration which is often present during the proliferative phase. Periorbital hemangiomas may cause amblyopia, impaired vision and astigmatism and should be considered when a hemangioma involves the eyelids or periorbital tissue. Approximately 43-60% of individuals with periocular lesions can develop amblyopia (Al Dhaybi, et al., 2011, Leaute-Labreze, et al., 2011). Lesions located on the ear may result in auditory impairment and secondary speech delay. Subglottic hemangiomas may cause hoarseness and stridor leading to respiratory impairment and are associated with at least 50% mortality if untreated (Peridis, et al., 2011). Many patients with subglottic hemangiomas also have cutaneous hemangiomas involving the lips, chin, and mandible. Hemangiomas may also be located on the cervicofacial area and lumbosacral spine. Pedunculated hemangiomas may be at risk for bleeding and irritation and have been associated with permanent cosmetic skin changes after involution such as fibrofatty tissue and excessive scarring. Although infrequent, larger hemangioma lesions may result in high-output heart failure due to high flow.

The main goals of treatment include preventing permanent disfigurement and minimizing psychosocial distress, preventing functional complications, and treating ulceration. Several modalities have been proven effective to treat hemangiomas and include the administration of steroid medications (e.g., topical, intralesional and systemic), pulsed dye laser therapy, and interferon. Corticosteroids have been associated with significant adverse events such as Cushing's

syndrome, hypertension, immunosuppression, hyperglycemia and adrenal suppression (Hogeling, et al., 2011). The pulsed-dye laser has been proven effective for the treatment of superficial hemangiomas, the superficial component of mixed hemangiomas and ulcerated hemangiomas. Efficacy is however limited by the depth of laser penetration. Several treatments may be necessary, and treatments have been associated with some risk of scarring (Rudolph, 2003). Other, less common treatments include: cryotherapy, other forms of laser surgery, and use of chemotherapeutic agents, such as vincristine and cyclophosphamide. Other forms of laser surgery have included the argon laser for hemangiomas, the Nd:YAG (neodymium: yttrium-aluminum-garnet) laser for deeper lesions, and carbon dioxide laser for lesions such as subglottic hemangiomas. Some of these devices have been associated with significant scarring. Surgical excision may be recommended for hemangioma lesions that are sharply demarcated and pedunculated, are ulcerated and bleeding, have not responded to other modalities of treatment, and those that threaten function (Rudolph, 2003).

Oral Propranolol: Oral propranolol has been utilized as a treatment for infantile hemangioma and is considered first-line treatment for infantile hemangiomas at risk for complications. Infantile hemangiomas occur in approximately 4% to 5% of newborns (Chamli, Litaiem, 2019; Wildgruber, et al., 2019). This type of treatment is aimed primarily at lesions that interfere or have potential to interfere with vital function and/or are life-threatening (Satterfield, et al., 2019; Krowchuk, et al., 2019; Drolet, et al., 2013). In some cases treatment may be recommended to improve cosmesis when there is risk of permanent disfigurement (Krowchuk, et al., 2019; Drolet, 2013).

Propranolol, a non-selective beta-blocker, exerts a vasoconstricting effect which may result in a change in color, reduction of lesion volume, softening and regression of the lesion. Induction of apoptosis is also a possible mechanism of action for reducing hemangioma lesions. Initiation of therapy may be performed in a hospital setting as either inpatient or outpatient depending on the resources available for safe monitoring. Although specific dosing, age for initiation of therapy, duration of treatment, and expected clinical outcomes are not firmly established, recommended treatment protocols have been published.

Evidence evaluating the use of propranolol as a treatment for infantile hemangioma is in the form of case reports, retrospective or prospective case series, and uncontrolled comparative trials involving small populations. Published randomized and/ or controlled trials are limited; however studies are currently being conducted through the U.S. National Institute of Health to further evaluate safety and efficacy. Published data indicate the type of hemangioma lesion most often treated is a clinically compromising lesion, such as orbital or airway lesion. Age for initiation of therapy has ranged from one month to five years although most subjects were less than 12 months of age. Reported efficacy is variable but tends to be higher when administered during infancy and the proliferative phase of involution, although regression of lesions has been documented when administered during the involution phase. Duration of therapy within these trials ranged from one to 12 months with six months being the average. Follow-up evaluation of clinical outcomes varied as well, ranging from immediately following initial treatment to 18 months post-treatment.

In 2019 the American Academy of Pediatrics (AAP) published clinical guidelines regarding management of infantile hemangiomas (IHs) (Krowchuk, et al, 2019). Within this guideline high risk IHs are defined as having evidence of or potential for those that result in life-threatening complications, functional impairment, ulceration, structural anomalies (e.g., in PHACE syndrome, LUMBAR syndrome) or permanent disfigurement (X; strong recommendation).Oral propranolol is considered as the first-line agent for IHs requiring systemic treatment (A; strong recommendation). The AAP noted that limited data exist on the utility of β-blockers other than propranolol or different delivery mechanisms for propranolol. Specific recommendations regarding pharmacotherapy are as follows:

- Dose propranolol between 2 and 3 mg/kg per day unless there are comorbidities (e.g., PHACE syndrome) or adverse effects (e.g., sleep disturbance) that necessitate a lower dose (A; moderate recommendation)
- Counsel that propranolol be administered with or after feeding and that doses be held at times of diminished oral intake or vomiting to reduce the risk of hypoglycemia (X; strong recommendation)
- Evaluate patients for and educate caregivers about potential adverse effects of propranolol, including sleep disturbances, bronchial irritation, and clinically symptomatic bradycardia and hypotension (X; strong recommendation)
- May prescribe oral prednisolone or prednisone to treat IHs if there are contraindications or an inadequate response to oral propranolol (B; moderate recommendation)
- May recommend intralesional injection of triamcinolone and/or betamethasone to treat focal, bulky IHs during proliferation or in certain critical anatomic locations (e.g., the lip) (B; moderate recommendation)
- May prescribe topical timolol maleate as a therapy for thin and/or superficial IHs (B; moderate recommendation)
- Surgical management and laser therapy may be recommended as treatment options in managing selected IHs (C; moderate recommendation).

AAP grading of recommendations and evidence for the above interventions is as follows:

- Level A- well-designed and conducted clinical trials, meta-analyses on applicable populations
- Level B- trials or diagnostic studies with minor limitations; consistent findings from multiple observational studies
- Level C- single or few observational studies or multiple studies with inconsistent findings or major limitations
- Level D- expert opinion, case reports, and reasoning first principles
- Level X- exceptional situation in which validating studies cannot be performed and there is a clear preponderance of benefit or harm.

- Strong recommendation- action is favored because anticipated benefits clearly exceed harms (or vice versa) and quality of evidence is excellent or unattainable.
- Moderate Recommendation-action is favored because anticipated benefits clearly exceed harms (or vice versa) and the quality of evidence is good but not excellent (or is unattainable)
- Weak Recommendation (based on low quality evidence) - action is favored because anticipated benefits clearly exceed harms (or vice versa), but quality of evidence is weak
- Weak Recommendation (based on balance of benefit and harms) - aggregate database shows evidence of both benefit and harm that appears to be similar in magnitude for any available courses of action.

Results of early clinical trials demonstrate clinical effectiveness as early as 24 hours following administration with reduction of volume, change in color from red to purple, and softening of the lesion (Leaute-Labreze, et al., 2011; Manunza, et al., 2010; Sans, et al., 2009). Complete regression in as little as two months following treatment has been reported (Sans, et al., 2009) and a majority of the published evidence since these early trials demonstrate positive response rates with partial to complete regression of lesions and minor side effects (Zhang, et al., 2017; El Hachem, et al., 2017; Léauté-Labrèze, et al., 2015; Léauté-Labrèze, et al., 2013; Luo, et al., 2014; Sharma, et al., 2013; Vassallo, et al., 2013; Hermans, et al., 2012; Ming-ming, et al., 2012; El-Essawy, et al., 2011; Spiteri Cornish and Reddy, 2011; Thoumazet, et al., 2011; Hogeling, et sl., 2011; Price, et al., 2011; Schupp, et al., 2011; Leaute-Labreze, et al., 2011; Al

Dhaybi, et al., 2011; Manunza, et al., 2010; Buckmiller, et al., 2010; Sans, et al., 2009). The results of meta-analyses comparing propranolol with other therapies have also supported safety and efficacy (Peridis, et al., 2011; Izadpanah, et al., 2013). Furthermore, in addition to regression of the lesions, improved clinical outcomes such as decrease in astigmatism, improved amblyopia (Vassallo, et al.,2013) and decreased airway obstruction (Hermans, et al., 2012) have been reported.

A systematic review published by Léauté-Labrèze and colleagues (2016) evaluating the safety of oral propranolol for treatment of infantile hemangioma provides support that treatment is well-tolerated if pretreatment assessments and within-treatment monitoring is performed. The systematic review included 5862 subjects who underwent treatment with oral propranolol and included manufacturers data (n=435 subjects), one Compassionate Use Program (n=1661 subjects), retrospective (n=44) and prospective (n=35) trials, noncontrolled (n=78) and nonrandomized (n=79) trials, as well as case series, cohort studies, and one open-label study versus historical control. The safety profile confirmed the use of oral propranolol for infantile hemangioma was similar to that observed when used for cardiologic indications. The authors report the most common related adverse events were transient, nonserious, and manageable; serious risks in certain cases can be avoided with appropriate screening and exclusion criteria, and in other cases it can be minimized and/or managed with appropriate monitoring, caregiver education, and discontinuation of therapy when necessary.

In a report from the Agency for Healthcare Research and Quality (Chinnadurai, et al., 2016) the authors systematically reviewed evidence addressing
the diagnosis and management of infantile hemangiomas (IH). The authors summarized data qualitatively and quantitatively using meta-analysis and evaluated the strength of evidence. A total of 81 studies evaluated oral propranolol, oral nadolol, oral atenolol, or timolol. The authors concluded beta blockers demonstrated significantly greater effects on reducing lesion size versus placebo or observation (high strength of evidence) and was also superior over various comparators. High mean rates of IH clearance with oral propranolol (95%, 95% Bayesian credible interval [BCI]: 88%–99%) were reported using meta-analysis. Other beta blockers demonstrated promising effectiveness however the strength of the evidence was considered low.

Randomized controlled trials comparing oral propranolol to standard therapies for treatment of cutaneous hemangiomas are limited, nonetheless there is an increasing body of evidence to support clinical efficacy for regression of lesions and improved clinical outcomes. Based on the available evidence and acceptance in the medical community, evidence in the peer-reviewed published scientific literature supports clinical efficacy for oral propranolol as a treatment for infants with complicated hemangiomas.

Published evidence evaluating safety and efficacy of other agents, used alone or in combination as treatment for infantile hemangioma, such as atenolol and topical timolol, have also demonstrated promising results (Abarzua-Araya, et al., 2014; Ge, et al., 2015; Xu, et al., 2015; Puttgen, et al., 2016; Danarti, et al., 2016; Marey, et al., 2018; Ji, et al., 2021).Topical timolol is not as effective, however it may be considered when the individual suffers from extreme side effects (Tan, et al., 2021); moreover the AAP has reported that topical timolol may be used to treat select thin and/or superficial IHs (B, moderate recommendation) (Krowchuk, et al., 2019). Ji et al., (2021) published results of a randomized controlled clinical trial evaluating safety and efficacy of propranolol versus atenolol in infants in China requiring systemic therapy for problematic IHs. The trial was a prospective multicenter noninferiority trial involving 377 subjects randomized to receive propranolol (n=190) or atenolol (n=187). The primary outcome was any response or nonresponse at six months in the intention to treat population of all patients randomized. Secondary outcomes included the hemangioma activity score (HAS) measured at 1, 4, 12, 24 weeks, and at two years. The authors reported there were no differences between groups in successful initial responses,

quality of life scores, complete ulceration healing times, or the rebound rate at two year follow-up. After six months of treatment the overall response rates were 93.7% and 92.5%, respectively for the propranolol and atenolol groups and at two years both groups presented a similar percentage of complete/nearly complete response rates (82.1% versus 79.7%, respectively). The authors reported that the frequency of adverse events did not differ between groups although the adverse events were more common in the propranolol group (79.0% versus 44.4%, respectively). The authors concluded atenolol had similar efficacy and fewer adverse events in the treatment of problematic IHs. Limitations of the trial noted by the authors include lack of a validated instrument for the primary outcome, participant recruitment from a tertiary treatment center which may introduce referral bias, lack of blinding, and inclusion of only superficial and mixed IHs**.**

Port Wine Stain
Port wine stains are a type of vascular malformation involving the superficial capillaries of the skin. They vary in size and location and are usually present at birth although not always clinically evident. In rare cases, port wine stains are acquired (Fitzpatrick, et al., 2018). Most often, lesions are found on the face, neck, arms or legs. They may be related to other underlying conditions, such as Sturge-Weber syndrome. Sturge-Weber syndrome, also known as encephalotrigeminal angiomatosis, is characterized by a facial port wine stain in a trigeminal V1 (i.e., ophthalmic) distribution, leptomeningeal angiomatosis, and choroidal vascular malformation of the eye, which can lead to ipsilateral glaucoma and buphthalmos. The most common ocular manifestation is glaucoma, which occurs in 30-60% of individuals with port wine stains on the forehead and/or eyelids; often seen with Sturge-Weber syndrome (Baselga, 2018).

Port wine stains appear as sharply demarcated pink-red patches that darken with time and do not proliferate; growth of the lesion is dependent upon growth of the child. As the child matures, the lesion may become raised and exhibit red-to-purple nodules and papules in adult years, leading to potential disfigurement (e.g., pebbly and slightly thickened surfaces), and bleeding with trauma. Hypertrophy may develop in the soft tissue underlying the port wine stain. Early treatment may prevent the progression of development to hypertrophy and nodules in later years. It has been noted port wine stain lesions on the forehead or eyelids can be associated with ocular disorders and warrant frequent ophthalmology exams to prevent damage to the eye.

Laser devices such as the argon, carbon dioxide (CO_2), Nd:YAG, and copper vapor laser have been used to treat port wine stains. In many cases, these laser devices have been associated with poor cosmetic outcomes. Pulsed dye laser therapy has been shown to be the most effective treatment for port wine stains; is associated with less adverse effects, including less post-operative scarring; and is considered the standard treatment of choice (Galbraith, et al., 2023; Fitzpatrick, et al., 2018; Tucci, et al., 2009). Evidence in the published medical literature suggests efficacy is increased if lesions are treated in infancy, although size and location are also predictors of outcome (Kelly, et al., 2021; Conlon, Drolet, 2004). Nonetheless, while most port wine stains lighten after a series of pulsed dye laser treatments, some cannot be completely removed (Kelly, et al., 2021; Y Fitzpatrick, et al., 2018).

Other Vascular Lesions/Malformations
Vascular malformations are present at birth and typically grow as the child grows. There are various methods of describing vascular malformations. In general, simple malformations consist of one type of vessel (e.g., capillaries, lymphatic vessels, or veins), with the exception of arteriovenous malformations (AVMs) which consist of both arterial and venous. Combined malformations consist of two or more vessel abnormalities in any combination. Vascular malformations can also be described by flow, depending on the arterial component, as either slow flow or fast flow. Fast flow malformations may be associated with high-output heart failure (Ricci, et. al., 2017).

Lymphatic (Lymphangioma): Lymphatic malformations consist of abnormally dilated lymphatic channels and although rare, may affect the head and neck area in children (lymphangioma). Most are present at birth although some may appear later in childhood as a result of infection or trauma. These lesions are either macrocystic or microcystic; microcystic are more difficult to treat and more often associated with complications. Aside from cosmetic concerns, depending on the size and location of the mass the lesion may be symptomatic. For example, when the oral and pharyngeal mucosa is involved, there may be tongue swelling, tongue hypertrophy, mucosal bleeding, speech difficulty, and airway compromise. Common complications include disfigurement, infection and bleeding. Treatment is aimed at improving cosmesis, and alleviating any associated symptoms and involves surgical excision in most instances (Tucci, et al, 2009; Wetmore, Potsic, 2010; Morelli, 2011; Freiden, et al., 2021), laser, cryotherapy, superficial radiotherapy and sclerotherapy are less commonly used (Micelli, Stewart, 2021).

Arteriovenous: Arteriovenous malformations (AVM) of the skin are rare; however this type of lesion is a direct connection of artery to vein, bypassing the capillary bed. AVMs may appear at any time from birth to early adulthood and often remain stable for several years. They usually become noticeable at times of hormonal changes and at times may suddenly enlarge following infection or trauma (Tucci, et al., 2009). If the lesions are asymptomatic treatment is not necessary, however if ulceration and/or bleeding develop treatment is warranted and consists of embolization and excision (Baselga, 2018).

Venous: Venous malformations include but are not limited to vein only malformations and angiokeratomas. These lesions vary in size and may be superficial, deep or a combination of both. The lesions grow as the child grows but have a tendency to enlarge during puberty or other hormonal changes (Boon, et al., 2022). For most lesions treatment is not necessary. When treatment is warranted, such as with pain from enlargement, treatment for superficial nodular lesions is surgical excision; larger deeper lesions may be treated with sclerotherapy. Other treatment modalities include ND:Yag laser therapy, endovenous laser therapy and elastic compression. In some instances treatments are combined to increase effectiveness (Boon, et al., 2022. Angiokeratomas are characterized by ectasia of the superficial dermal vessels with hyperkeratosis of the overlying dermal layer (Freiden, et al., 2021).They appear as flat hemangiomas with an irregular surface, with surgical excision being the treatment of choice (Wetmore, Potsic, 2010). Although angiokeratomas are generally asymptomatic bleeding and itching may occur with trauma.

Fibro-Adipose Vascular Anomaly (FAVA): FAVA has been described as a "new vascular entity"; reportedly a vascular-type malformation, occurring in children, teens or young adults, often associated with pain and dysfunction, occurring mainly in the extremities. The anomaly has been defined as "a fibro-adipose vascular anomaly involving veins that are engorged and intertwined with fibrofatty tissue in the muscle, and subcutaneous and cutaneous lymphatic malformation" (Shaikh, et al., 2016; Alomari, et al., 2017) and may be associated with contracture formation. It is a slow-flow vascular-type malformation (venous to lymphatic) (Alomari, et al., 2017). There is limited information in the peer-reviewed published scientific literature evaluating the occurrence of FAVA and treatment outcomes. Conventional management generally includes observation, sclerotherapy, intralesional steroid injection, cryotherapy or ablation; if restriction of movement is present surgical resection/excision may be indicated (Khera, et al., 2021). Authors generally agree however further studies are needed to better define the condition and effective clinical management.

U.S. Food and Drug Administration (FDA)
Lasers are regulated by the FDA as Class II devices and receive approval through the 510(k) process. According to the FDA, pulsed dye lasers are indicated for use in the treatment of

cutaneous vascular lesions such as port wine stains and hemangiomas, and benign cutaneous lesions such as warts, striae and some forms of psoriasis.

Professional Societies/Organizations
The American Academy of Pediatrics (AAP) published a clinical practice guideline for the management of hemangiomas (Krowchuk, et al., 2019). Within this guideline the AAP classifies IHs as high risk if there is evidence of or potential for life threatening complications, functional impairment, ulceration, structural anomalies or permanent disfigurement. The authors recommend early consult (by one month of age) for lesions that are potentially high risk and report that oral propranolol is the treatment of choice for problematic IHs that require systemic therapy.

Medicare Coverage Determinations

	Contractor	Determination Name/Number	Revision Effective Date
NCD	National	Laser Procedures (140.5)	05/01/1997
LCD		No Local Coverage Determination	

Note: Please review the current Medicare Policy for the most up-to-date information.
(NCD = National Coverage Determination; LCD = Local Coverage Determination)

Coding Information

Notes:
1. This list of codes may not be all-inclusive since the American Medical Association (AMA) and Centers for Medicare & Medicaid Services (CMS) code updates may occur more frequently than policy updates.
2. Deleted codes and codes which are not effective at the time the service is rendered may not be eligible for reimbursement.

Considered Medically Necessary when criteria in the applicable policy statements listed above are met:

Port Wine Stains

CPT®* Codes	Description
17106	Destruction of cutaneous vascular proliferative lesions (eg, laser technique); less than 10 sq cm
17107	Destruction of cutaneous vascular proliferative lesions (eg, laser technique); 10.0 to 50.0 sq cm
17108	Destruction of cutaneous vascular proliferative lesions (eg, laser technique); over 50.0 sq cm

Hemangiomas and Other Vascular Malformations

CPT®* Codes	Description
17106	Destruction of cutaneous vascular proliferative lesions (eg, laser technique); less than 10 sq cm

CPT®* Codes	Description
17107	Destruction of cutaneous vascular proliferative lesions (eg, laser technique); 10.0 to 50.0 sq cm
17108	Destruction of cutaneous vascular proliferative lesions (eg, laser technique); over 50.0 sq cm

Oral Propranolol Administration to an Infant in the Inpatient Setting

HCPCS Codes	Description
J8499	Prescription drug, oral, nonchemotherapeutic, NOS

References

1. Abarzua-Araya A, Navarrete-Dechent CP, Husser F, et al. Atenolol versus propranolol for the treatment of infantile hemangiomas: A randomized controlled study. J Am Acad Dermatol. 2014;70(6):1045-1049.

2. Al Dhaybi R, Superstein R, Milet A, Powell J, Dubois J, McCuaig C, Codère F, Hatami A, Chevrette L, Fallaha N, Hamel P, Ospina LH. Treatment of periocular infantile hemangiomas with propranolol: case series of 18 children. Ophthalmology. 2011 Jun;118(6):1184-8.

3. Alomari AI, Spencer SA, Arnold RW, et al. Fibro-adipose vascular anomaly: clinical-radiologic-pathologic features of a newly delineated disorder of the extremity. J Pediatr Orthop. 2014 Jan;34(1):109-17.

4. American Osteopathic College of Dermatology (AOCD). Hemangiomas. Accessed Feb 23, 2024. Available at URL address: http://www.aocd.org/skin/dermatologic_diseases/hemangiomas.html

5. Antaya RJ. Infantile hemangioma. eMedicine specialties > Dermatology > Diseases of the vessels. Last updated Nov 9, 2020. Accessed Feb 23, 2024. Available at URL address: http://www.emedicine.com/derm/topic201.htm

6. Asahina A, Watanabe T, Kishi A, Hattori N, Shirai A, Kagami S, et al. Evaluation of the treatment of port-wine stains with the 595-nm long pulsed dye laser: a large prospective study in adult Japanese patients. J Am Acad Dermatol. 2006 Mar;54(3):487-93.

7. Baselga E., Vascular malformations. Dermatology. 4th edition. © 2018 Elsevier Limited.

8. Boon LM, Vikkula M, Seront E. Venous malformations. Updated May 16, 2022. Current through Feb 2023. UpToDate®.

9. Broeks IJ, Hermans DJ, Dassel AC, van der Vleuten CJ, van Beynum IM. Int J Pediatr Otorhinolaryngol. 2013 Nov;77(11):1791-800.

10. Buckmiller LM, Munson PD, Dyamenahalli U, Dai Y, Richter GT. Propranolol for infantile hemangiomas: early experience at a tertiary vascular anomalies center. Laryngoscope. 2010 Apr;120(4):676-81.

11. Buster KJ, Stevens EI, Elmets CA. Dermatologic health disparities. Dermatol Clin. 2012 Jan;30(1):53-9.

12. Centers for Medicare and Medicaid Services (CMS). National Coverage Determination (NCD) for laser Procedures (140.5). Available at URL address: https://www.cms.gov/medicare-coverage-database/indexes/ncd-alphabetical-index.aspx?bc=AgAAAAAAAAAA&

13. Chamli A, Litaiem N. Hemangioma. StatPearls, StatPearls Publishing, LLC. Jan 2019.

14. Chan YC, Giam YC. Guidelines of care for cutaneous hemangiomas. Ann Acad Med Singapore. 2005;34:117-23.

15. Cheerva AC, Bertolone S. Kasabach-Merritt Syndrome. emedicine. Updated September 12, 2022. Accessed Feb 23, 2024. Available at URL address: http://emedicine.medscape.com/article/956136-overview

16. Chinnadurai S, Snyder K, Sathe N, et al. Diagnosis and Management of Infantile Hemangioma. Jan 2016. Comparative Effectiveness Reviews. Accessed Feb 23, 2024. Available at URL address: http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0084993/

17. Christison-Lagay ER, Fishman SJ. Vascular anomalies. Surg Clin North Am. 2006 Apr;86(2):393-425,x.

18. Claerhout I, Buijsrogge M, Delbeke P, Walraedt S, De Schepper S, De Moerloose B, De Groote K, Decock C. The use of propranolol in the treatment of periocular infantile haemangiomas: a review. Br J Ophthalmol. 2011 Sep;95(9):1199-202.

19. Conlon JD, Drolet BA. Skin lesions in the neonate. Pediatr Clin North Am. 2004 Aug;51(4):863-88, vii-viii.

20. Dalby TK, Lester-Smith D. Propranolol for the treatment of infantile haemangioma. J Paediatr Child Health. 2013 Feb;49(2):148-51. doi: 10.1111/jpc.12076.

21. Danarti R, Ariwibowo L, Radiono S, Budiyanto A. Topical Timolol Maleate 0.5% for Infantile Hemangioma: Its Effectiveness Compared to Ultrapotent Topical Corticosteroids - A Single-Center Experience of 278 Cases. Dermatology. 2016;232(5):566-571.

22. Darrow DH, Greene AK, Mancini AJ, et al. Diagnosis and Management of Infantile Hemangioma. Pediatrics. 2015 Oct;136(4):e1060-104.

23. de Melo JN, Rotter A, Rivitti-Machado MC, de Oliveira ZN. Propranolol for treatment of infantile hemangiomas. An Bras Dermatol. 2013 Nov-Dec;88(6 Suppl 1):220-3.

24. Drolet BA, Esterly NB, Frieden IJ. Hemangiomas in children. New Engl J Med. 1999 Jul;341(3):173-181.

25. Drolet BA, Frommelt PC, Chamlin SL, Haggstrom A, Bauman NM, Chiu YE, et al. Initiation and use of propranolol for infantile hemangioma: report of a consensus conference. Pediatrics. 2013 Jan;131(1):128-40. doi: 10.1542/peds.2012-1691.

26. El-Essawy R, Galal R, Abdelbaki S. Nonselective β-blocker propranolol for orbital and periorbital hemangiomas in infants: a new first-line of treatment? Clin Ophthalmol. 2011;5:1639-44.

27. El Hachem M, Gesualdo F, Diociaiuti A, et al. Safety and effectiveness of oral propranolol for infantile hemangiomas started before 5 weeks and after 5 months of age: an Italian multicenter experience. Ital J Pediatr. 2017 Apr 19;43(1):40.

28. Faurschou A, Togsverd-Bo K, Zachariae C, Haedersdal M. Pulsed dye laser vs. intense pulsed light for port-wine stains: a randomized side-by-side trial with blinded response evaluation. Br J Dermatol. 2009 Feb;160(2):359-64.

29. Fernandez-Pineda I, Marcilla D, Downey-Carmona FJ, Roldan S, Ortega-Laureano L, Bernabeu-Wittel J. Lower Extremity Fibro-Adipose Vascular Anomaly (FAVA): A New Case of a Newly Delineated Disorder. Ann Vasc Dis. 2014;7(3):316-9.

30. Fitzpatrick JE , High WA, Urgent Care Dermatology: Symptom-Based Diagnosis, Additional conditions (online). Philadelphia PA, Elsevier, Inc., 2018.

31. Freiden IJ, Adams D. Rapidly involuting congenital hemangioma (RICH) and noninvoluting congenital hemangioma (NICH). May 12, 2021. Current as of Feb 2023. © 2023 UpToDate.

32. Galbraith S, Levy ML, Corona R. Capillary malformations (port wine stains) and associated syndromes. March 6, 2023. Current as of Feb 2023. © 2023 UpToDate.

33. Ge J, Zheng J, Zhang L, et al. Oral propranolol combined with topical timolol for compound infantile hemangiomas: A retrospective study. Sci Rep. 2016;6:19765.

34. Greene AK, Sudduth CL. Overview of vascular intervention and surgery for vascular anomalies. Updated Jun 6, 2022. Current as of Feb 2023. © 2023 UpToDate.

35. Haggstrom AN, Drolet BA, Baselga E, Chamlin SL, Garzon MC, Horii KA, Lucky AW, Mancini AJ, Metry DW, Newell B, Nopper AJ, Frieden IJ. Prospective study of infantile hemangiomas: clinical characteristics predicting complications and treatment. Pediatrics. 2006 Sep;118(3):882-7.

36. Harikrishna B, Ganesh A, Al-Zuahibi S, Al-Jabri S, Al-Waily A, Al-Riyami A, Al-Azri F, Masoud F, Al-Mujaini A. Oral propranolol for the treatment of periorbital infantile hemangioma: a preliminary report from oman. Middle East Afr J Ophthalmol. 2011 Oct;18(4):298-303.

37. Hermans DJ, Bauland CG, Zweegers J, van Beynum IM, van der Vleuten CJ. Propranolol in a case series of 174 complicated infantile haemangioma patients: Indications, safety and future directions. Br J Dermatol. 2012 Dec 22.

38. Hogeling M, Adams S, Wargon O. A randomized controlled trial of propranolol for infantile hemangiomas. Pediatrics. 2011 Aug;128(2):e259-66.

39. Hooper J, Shao K, Feng H, Racial/Ethnic Health Disparities in Dermatology in the United States Part 1: Overview of Contributing Factors and Management Strategies, Journal of the American Academy of Dermatology(2022); Feb 2022; 7:S0190-9622(22)00194.

40. Huang JT, Liang MG. Vascular malformations. Pediatr Clin North Am. 2010 Oct; 57(5):1091-110.

41. Hussain MS, Emery DJ, Lewis JR, Johnston WS. Sturge-Weber syndrome diagnosed in a 45-year-old man. CMAJ. 2004 May;170(11):1672.

42. Izadpanah A, Izadpanah A, Kanevsky J, Belzile E, Schwarz K. Propranolol versus Corticosteroids in the Treatment of Infantile Hemangioma: A Systematic Review and Meta-Analysis. Plast Reconstr Surg. 2013 Mar;131(3):601-13.

43. Ji Y, Chen S, Yang K, Zhang X, Zhou J, Li L, Xiang B, Qiu T, Dai S, Jiang X, Lu G, Qiu L, Kong F, Zhang Y. Efficacy and Safety of Propranolol vs Atenolol in Infants With Problematic Infantile Hemangiomas: A Randomized Clinical Trial. JAMA Otolaryngol Head Neck Surg. 2021 Jul 1;147(7):599-607.

44. Kelly KM, Dover JS, Levy ML, Corona R. Laser and light therapy for cutaneous vascular lesions. Updated May 25, 2021. Current as of Feb 2023. © 2023 UpToDate.

45. Kono T, Sakurai H, Groff WF, Chan HH, Takeuchi M, Yamaki T, et al. Comparison study of a traditional pulsed dye laser versus a long-pulsed dye laser in the treatment of early childhood hemangiomas. Lasers Surg Med. 2006 Feb;38(2):112-5.

46. Krowchuk DP, Frieden IJ, Mancini AJ, et al. American Academy of Pediatrics. Clinical Practice Guideline for the Management of Infantile Hemangiomas. Pediatrics. 2019;143(1):e20183475.

47. Lawley LP, Siegfried E, Todd JL. Propranolol treatment for hemangioma of infancy: risks and recommendations. Pediatr Dermatol. 2009 Sep-Oct;26(5):610-4.

48. Léaute-Labrèze C, Boccara O, Degrugillier-Chopinet C, et al. Safety of Oral Propranolol for the Treatment of Infantile Hemangioma: A Systematic Review. Pediatrics. 2016 Oct;138(4).

49. Léauté-Labrèze C, Dumas de la Roque E, Nacka F, Abouelfath A, Grenier N, Rebola M, Ezzedine K, Moore N. Double-blind randomized pilot trial evaluating the efficacy of oral propranolol on infantile haemangiomas in infants < 4 months of age. Br J Dermatol. 2013 Jul;169(1):181-3.

50. Léauté-Labrèze C, Hoeger P, Mazereeuw-Hautier J, Guibaud L, Baselga E, Posiunas G., et al. A randomized, controlled trial of oral propranolol in infantile hemangioma. N Engl J Med. 2015 Feb 19;372(8):735-46.

51. Legiehn GM, Heran MKS. Venous malformations: Classification, Development, Diagnosis, and Interventional Radiologic Management. Radiol Clin North Am. 2008 May;46(3):545-97, vi.

52. Lie E, Psoter KJ, Püttgen KB. Lower Socioeconomic Status is Associated with Delayed Access to Care for Infantile Hemangioma, a Cohort Study. J Am Acad Dermatol. 2018 Oct 1:S0190-9622(18)32652-5.

53. Luks VL, Kamitaki N, Vivero MP, et al. Lymphatic and other vascular malformative/overgrowth disorders are caused by somatic mutations in PIK3CA. J Pediatr. 2015 Apr;166(4):1048-54.e1-5.

54. Luo Y, Zeng Y, Zhou B, Tang J. A Retrospective Study of Propranolol Therapy in 635 Infants with Infantile Hemangioma. Pediatr Dermatol. 2014 Mar 6.

55. Lv MM, Fan XD, Su LX. Propranolol for problematic head and neck hemangiomas: An analysis of 37 consecutive patients. Int J Pediatr Otorhinolaryngol. 2012 Feb 10.

56. Ma X, Zhao T, Xiao Y, Yu J, Chen H, Huang Y, Liu J, Lin J, Ouyang T. Preliminary experience on treatment of infantile hemangioma with low-dose propranolol in China. Eur J Pediatr. 2013 Jan 23.

57. Malik MA, Menon P, Rao KL, Samujh R. Effect of propranolol vs prednisolone vs propranolol with prednisolone in the management of infantile hemangioma: a randomized controlled study. J Pediatr Surg. 2013 Dec;48(12):2453-9.

58. Manunza F, Syed S, Laguda J, et al. Propranolol for complicated infantile haemangiomas: a case series of 30 infants. Br J Dermatol. 2010 Feb 1;162(2):466-8.

59. Marcdante KJ, Kliegman RM, Schuh AM. Vascular anomalies. In: Nelson essentials of Pediatrics. Ninth Edition, Copyright © 2023 by Elsevier, Inc. Chapter 194; 746-747.

60. Marey HM, Elmazar HF, Mandour SS, Khairy HA. Combined Oral and Topical Beta Blockers for the Treatment of Early Proliferative Superficial Periocular Infantile Capillary Hemangioma. J Pediatr Ophthalmol Strabismus. 2018 Jan 1;55(1):37-42.

61. Menezes MD, McCarter R, Greene EA, Bauman NM. tatus of propranolol for treatment of infantile hemangioma and description of a randomized clinical trial. Ann Otol Rhinol Laryngol. 2011 Oct;120(10):686-95.

62. Metry DW, Levy ML, Corona R. Infantile hemangiomas: Management. Updated Feb 14, 2023. Current as of Feb 2023. © 2023 UpToDate.

63. Miceli A, Stewart KM. Lymphangioma. 2021 Aug 12. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan.

64. Morelli JG. Vascular disorders. Ch 642. In: Kliegman: Nelson Textbook of Pediatrics. 19th, ed. Copyright © 2011 Saunders.

65. National Institute for Health and Care Excellence (NICE). IPG90 Intralesional photocoagulation of subcutaneous congenital vascular disorders: guidance. September 2004. Accessed Feb 23, 2024. Available at URL address: https://www.nice.org.uk/guidance/ipg90

66. Nouri K, Alster TS. Laser Treatment of Acquired and Congenital Vascular Lesions. eMedicine. Updated Jul 2018. Accessed Feb 23, 2024. Available at URL address: http://emedicine.medscape.com/article/1120509-overview

67. Novoa M1, Baselga E, Beltran S, et al. Interventions for infantile hemangiomas of the skin. Cochrane Database Syst Rev. 2018 Apr 18;4:CD006545.

68. Parikh SR, Darrow DH, Grimmer JF, Manning SC, Richter GT, Perkins JA. Propranolol use for infantile hemangiomas: American Society of Pediatric Otolaryngology Vascular

Anomalies Task Force Ppractice Patterns. JAMA Otolaryngol Head Neck Surg. 2013 Feb 1;139(2):153-6.

69. Patel SR, Rosenberg JB, Barmettler A. Interventions for orbital lymphangioma. Cochrane Database Syst Rev. 2019 May 15;5:CD013000.

70. Peridis S, Pilgrim G, Athanasopoulos I, Parpounas K. A meta-analysis on the effectiveness of propranolol for the treatment of infantile airway haemangiomas. Int J Pediatr Otorhinolaryngol. 2011 Apr;75(4):455-60.

71. Price CJ, Lattouf C, Baum B, et al. Propranolol vs corticosteroids for infantile hemangiomas: A multicenter retrospective analysis. Arch Dermatol. 2011;147(12):1371-1376.

72. Püttgen K, Lucky A, Adams D, et al. Topical Timolol Maleate Treatment of Infantile Hemangiomas. Pediatrics. 2016 Sep;138(3).

73. Ricci KW. Advances in the Medical Management of Vascular Anomalies. Semin Intervention Radiology. 2017 Sep; 34(3):239-249.

74. Rothfleisch JE, Kosann MK, Levine VJ, Ashinoff R. Laser treatment of congenital and acquired vascular lesions: a review. Dermatol Clin. 2002 Jan;20(1):1-18.

75. Rudolph CD. Vascular tumors and malformations: hemangioma in infancy. In: Rudolph CD, Rudolph AM, Hostetter MK, Lister GE, Siegel NJ, editors. Rudolph's Pediatrics. 21st ed. New York, NY: McGraw-Hill; 2003. Chapter 14.

76. Sabeti S, Ball KL, Burkhart C, Eichenfield L, Fernandez Faith E, Frieden IJ, Geronemus R, Gupta D, Krakowski AC, Levy ML, Metry D, Nelson JS, Tollefson MM, Kelly KM. Consensus Statement for the Management and Treatment of Port-Wine Birthmarks in Sturge-Weber Syndrome. JAMA Dermatol. 2021 Jan 1;157(1):98-104.

77. Sánchez-Carpintero I, Ruiz-Rodriguez R, López-Gutiérrez JC. Propranolol in the treatment of infantile hemangioma: clinical effectiveness, risks, and recommendations. Actas Dermosifiliogr. 2012 Feb 13.

78. Sans V, de la Roque ED, Berge J, Grenier N, Boralevi F, Mazereeuw-Hautier J, Lipsker D, Dupuis E, Ezzedine K, Vergnes P, Taïeb A, Léauté-Labrèze C. Propranolol for severe infantile hemangiomas: follow-up report. Pediatrics. 2009 Sep;124(3):e423-31.

79. Satterfield KR, Chambers CB. Current treatment and management of infantile hemangiomas. Surv Ophthalmol. 2019 Sep - Oct;64(5):608-618.

80. Schmults CD. Laser treatment of vascular lesions. Dermatol Clin. 2005 Oct;23(4):745-55.

81. Schupp CJ, Kleber JB, Günther P, Holland-Cunz S. Propranolol therapy in 55 infants with infantile hemangioma: dosage, duration, adverse effects, and outcome. Pediatr Dermatol. 2011 Nov-Dec;28(6):640-4.

82. Seiff S, Zwick OM, Carter S. Hemangioma, capillary: Treatment & medication. eMedicine Specialties. Updated Jan 2023. Accessed Feb 23, 2024. Available at URL address: http://emedicine.medscape.com/article/1218805-treatment

83. Shah SS, Snelling BM, Sur S, Ramnath AR, Bandstra ES, Yavagal DR. Scalp congenital hemangioma with associated high-output cardiac failure in a premature infant: Case report and review of literature. Interv Neuroradiol. 2017 Feb;23(1):102-106.

84. Shaikh R, Alomari AI, Kerr CL, Miller P, Spencer SA. Cryoablation in fibro-adipose vascular anomaly (FAVA): a minimally invasive treatment option. Pediatr Radiol. 2016 Jul;46(8):1179-86.

85. Shao K, Hooper J, Feng H. Racial/Ethnic Health Disparities in Dermatology in the United States Part 2: Disease-specific Epidemiology, Characteristics, Management, and Outcomes. J Am Acad Dermatol. 2022 Feb; 7-S0190-9622(22)00195-2.

86. Sharma VK, Fraulin FO, Dumestre DO, Walker L, Harrop AR. Beta-blockers for the treatment of problematic hemangiomas. Can J Plast Surg. 2013 Spring;21(1):23-8.

87. Spiteri Cornish K, Reddy AR. The use of propranolol in the management of periocular capillary haemangioma--a systematic review. Eye (Lond). 2011 Oct;25(10):1277-83.

88. Tan X, Guo S, Wang C. Propranolol in the Treatment of Infantile Hemangiomas. Clin Cosmet Investig Dermatol. 2021 Sep 3;14:1155-1163.

89. Thomas J, Kumar P, Kumar DD. Ulcerated infantile haemangioma of leg successfully treated with propranolol. J Cutan Aesthet Surg. 2011 Sep;4(3):211-3.

90. Tomson N, Lim SP, Abdullah A, Lanigan SW. The treatment of port-wine stains with the pulsed-dye laser at 2-week and 6-week intervals: a comparative study. Br J Dermatol. 2006 Apr;154(4):676-9.

91. Tucci FM, De Vincentiis GC, Sitzia E, Giuzio L, Trozzi M, Bottero S. Head and neck vascular anomalies in children. Int J Pediatr Otorhinolaryngol. 2009 Dec;73 Suppl 1:S71-6.

92. U.S. Food and Drug Administration (FDA). Cynergy Laser. 510(k) summary. K043429. Accessed Feb 23, 2024. Available at URL address: http://www.accessdata.fda.gov/cdrh_docs/pdf4/K043429.pdf

93. Utami AM, Azahaf S, de Boer OJ, van der Horst CMAM, Meijer-Jorna LB, van der Wal AC. A literature review of microvascular proliferation in arteriovenous malformations of skin and soft tissue. J Clin Transl Res. 2021 Jul 30;7(4):540-557.

94. Vassallo P, Forte R, Di Mezza A, Magli A. Treatment of infantile capillary hemangioma of the eyelid with systemic propranolol. Am J Ophthalmol. 2013 Jan;155(1):165-170.e2.

95. Wang Q, Xiang B, Chen S, Ji Y. Efficacy and safety of oral atenolol for the treatment of infantile haemangioma: A systematic review. Australas J Dermatol. 2019 Aug;60(3):181-185.

96. Wetmore RF, Potsic WP. Differential diagnosis of neck masses. Congenital masses. IN: Flint: Cummings Otolaryngology: Head & Neck Surgery, 5th ed. Ch 198. Copyright © 2010 Mosby.

97. Weitz N A, Lauren C T, Starc T J et al.Congenital cutaneous hemangioma causing cardiac failure: a case report and review of the literature. Pediatr Dermatol. 2013;30(06):e180–e190.

98. Wildgruber M, Sadick M, Muller-Wille R, Wohlgemuth WA. Vascular tumors in infants and adolescents. Insights Imaging. 2019 Mar 13;10(1):30.

99. Xu DP, Cao RY, Tong S, et al. Topical timolol maleate for superficial infantile hemangiomas: An observational study. J Oral Maxillofac Surg. 2015;73(6):1089-1094.

100. Yang MU, Yaroslavsky AN, Farinelli WA, Flotte TJ, Rius-Diaz F, Tsao SS, Anderson RR. Long-pulsed neodymium: yttrium-aluminum-garnet laser treatment for port-wine stains. J Am Acad Dermatol. 2005 Mar;52(3 Pt 1):480-90.

101. Ying H, Zou Y, Yu W, et al. Prospective, open-label, rater-blinded and self-controlled pilot study of the treatment of proliferating superficial infantile hemangiomas with 0.5% topical timolol cream versus 595-nm pulsed dye laser. J Dermatol. 2017 Feb 13.

102. Young DM, Mathes SJ. Vascular tumors. In: Schwartz SI, Shires GT, Spencer FC, Daly JM, Fischer JE, Galloway AC, editors. Principles of Surgery. Philadelphia, PA: McGraw-Hill Companies, Inc.; 1999. Chapter 13: Skin and Subcutaneous Tissue: Benign Tumors.

103. Zhang L, Wu HW, Yuan W, Zheng JW. Propranolol therapy for infantile hemangioma: our experience. Drug Des Devel Ther. 2017 May 8;11:1401-1408.

Revision Details

Type of Revision	Summary of Changes	Date
Annual Review	• No changes to coverage.	05/15/2024
Focused Review	• Removed policy statement pertaining to vascular embolization/occlusion (CPT codes 61626, 37241, 37242) of cutaneous and/or deep tissue hemangioma or other vascular malformation (e.g., venous, arteriovenous, lymphatic).	11/01/2024