Pulsed dye laser for port-wine stain and infantile hemangioma

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Policy contains: Infantile hemangiomas, laser treatment; port-wine stains; propranolol.

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Coverage policy

Pulsed dye laser treatment for port-wine stains and infantile hemangiomas is clinically proven and, therefore, may be medically necessary for any of the following indications (Darrow, 2015; Krowchuk, 2019; Randel, 2016; Sabeti, 2021):

- Emergency therapy due to life-threatening complications.
- Urgent therapy of existing or imminent functional impairment, pain, or bleeding.
- Evaluation to identify structural anomalies potentially associated with the disorder.
- Elective treatment to reduce likelihood of long-term or permanent disfigurement.

Only pulsed dye laser therapy should be used for port-wine stains (Sabeti, 2021), and it should be used for infantile hemangiomas only in refractory cases (Darrow, 2015; Krowchuk, 2019). Propranolol should be used for

systemic therapy for infantile hemangiomas, at 2 – 3 mg/kg daily, for at least six months to as many as 12 months (Krowchuk, 2019).

Note: Depending on the extent of the port-wine stains, several laser treatments may be required, spaced at two- to three-month intervals.

Limitations

No limitations were identified during the writing of this policy.

Alternative covered services

- Adjuvant medications (e.g., propranolol).
- Photodynamic therapy.
- Surgical debulking and excision.
- Consultation with dermatologist.

Background

A port-wine stain (nevus flammeus) is a red or purple mark, often on the face. Port-wine stains represent the most common cutaneous vascular lesions and are commonly known as fire marks. They are caused by a localized area of abnormal blood vessels (capillaries). About three in 1,000 babies are born with port-wine stains (Nguyen, 2019). Most occur on the face, but any area of the skin can be affected. Although the vast majority of port-wine stains are present at birth, they can occasionally develop later on (Cunliffe, 2022b).

A modest percentage of port-wine stains located over the eye and central forehead can be associated with glaucoma and/or complications in the brain resulting in seizures or developmental disabilities. This association of facial port-wine stains and glaucoma and/or seizures is called the Sturge-Weber Syndrome. The location and the extent of the port-wine stains on one extremity can lead to enlargement of the extremity relative to an unaffected limb (Klippel-Trenaunay-Weber Syndrome) (Cunliffe, 2022b).

Infantile hemangiomas are the most common benign childhood tumors. They are classified according to the International Society for the Study of Vascular Anomalies as distinct from more proliferative vascular malformations with implications for care management, as most infantile hemangiomas do not require imaging for diagnosis or aggressive treatment (Wildgruber, 2019). They typically develop within four to six weeks of birth, and approximately 20% are present at birth. Infantile hemangioma may present as a superficial nevus or as a deeply set lesion in the dermis and subcutis. While most lesions require no treatment, some can grow rapidly, bleed, or ulcerate. Segmental proliferative hemangiomas present the most challenges**,** as they occur at a younger age, can grow up to ten times larger, and are more likely to have associated congenital anomalies (Cunliff, 2022a).

Genetic mechanisms underlying infantile hemangiomas have been implicated in certain multi-organ birth defect syndromes. These syndromes include the acronyms PHACE (***P***osterior fossa brain malformations, segmental facial ***H***emangiomas, ***A***rterial anomalies, ***C***ardiac defects, ***E***ye anomalies, and sternal clefting or supraumbilical raphe) and LUMBAR (***L***ower body hemangiomas, ***U***rogenital anomalies, ***M***yelopathy, ***B***one deformities, ***A***norectal malformations/***A***rterial anomalies, and ***R***enal anomalies) (Siegel, 2018).

A distant subset of infantile hemangioma consists of multiple small lesions varying in size from a few millimeters to one to two centimeters. This form of infantile hemangioma (so-called multiple neonatal hemangiomatosis) has a higher risk of visceral involvement, particularly in the liver and gastrointestinal tract; however, the prognosis for the skin lesions is usually good, as they often involute by two years of age (Wildgruber, 2019).

Pulsed dye lasers target oxyhemoglobin and deoxyhemoglobin. They penetrate up to two millimeters of skin with a duration of just milliseconds. The procedure is delivered in outpatient settings, over multiple sessions, with or without anesthesia. The U.S. Food and Drug Administration has approved a variety of lasers for marketing, through the 510(k) process, for a variety of dermatologic indications, including treatment of port-wine stains and infantile hemangiomas. The flashlamp-pulsed dye laser emits a yellow light wave length of 595 to 600 nanometers, which allows deeper penetration than the original 577 nanometer models introduced in the 1980s (Brightman, 2015).

Findings

The evidence base for pulsed dye laser treatment consists of multiple clinical practice guidelines from the American Academy of Pediatrics (Darrow, 2015; Krowchuk, 2019; Randel, 2016) and dermatological consensus statements (Sabeti, 2021), supported by extensive systematic reviews and meta-analyses encompassing over 10,000 patients (Hashemi, 2024). For port-wine stains, systematic reviews demonstrate clearance rates ranging from 21% achieving 75-100% clearance (van Raath, 2019) to 89% achieving good to excellent clearance in more recent studies (Hashemi, 2024), with permanent adverse effects occurring in less than 1% of patients (Hashemi, 2024; Shi, 2023). The evidence confirms pulsed dye laser as the gold standard treatment for port-wine stains, though newer modalities like hemoporfin-mediated photodynamic therapy show promise for resistant cases (Nguyen, 2024). For infantile hemangiomas, the evidence supports propranolol as first-line systemic therapy (Jangid, 2024; Krowchuk, 2019), with pulsed dye laser demonstrating 80-90% response rates (Jangid, 2024) and particular effectiveness for superficial lesions and refractory cases (Chaple Gil, 2025). Combination therapy with beta-blockers and pulsed dye laser shows superior outcomes to monotherapy (Chaple Gil, 2025; Chen, 2020), with shorter treatment duration and lower recurrence rates. Early intervention improves outcomes for both conditions (Hashemi, 2024; Sabeti, 2021), though optimal treatment protocols remain undetermined and must be individualized based on factors including lesion characteristics, patient age, and skin type.

Guidelines

A consensus statement from dermatological experts in the United States recommends pulsed dye laser as the standard treatment for port-wine stains regardless of lesion size, location, or color. Laser treatment is safe for people of all ages when performed by experienced physicians to minimize the psychosocial impact and to diminish nodularity and potential tissue hypertrophy. Treatment efficacy is higher in patients with lighter skin types. In patients with skin of color (e.g., Fitzpatrick skin types V and VI), higher rates of side effects, mainly dyspigmentation and atrophic scarring, may be observed, but moderate energy densities, less pulse overlap, and increased cooling may minimize these risks. Starting treatment at an earlier age may achieve better outcomes, and the use of general anesthesia in young patients should be considered on a case-by-case basis (Sabeti, 2021).

An American Academy of Pediatrics guideline notes that since 2008, propranolol has been used to treat infantile hemangioma. The guideline recommends the drug, with cardiovascular monitoring every hour for two hours, with repeat monitoring for any dose increase over five mg/kg. If propranolol cannot be used or is ineffective, corticosteroids (usually daily oral prednisone or prednisolone) can be an alternative therapy. Laser therapy may be useful in treating early lesions (Randel, 2016).

A 2015 report from the American Academy of Pediatrics provided updates on the pathogenesis, treatment, and clinical associations of infantile hemangiomas, including the use of pulsed dye laser for refractory cases (Darrow, 2015).

The most recent American Academy of Pediatrics guideline on infantile hemangiomas declares that pulsed dye laser is safe and effective, and evidence has demonstrated that pulsed dye is more effective than other laser

therapies, although acknowledging there is controversy over using the technique in infants. The guideline also recommends using propranolol for systemic treatment of infantile hemangiomas (Krowchuk, 2019).

Systematic Reviews and Meta-Analyses

Port-wine stains - Efficacy and outcomes

A review of 65 studies (n = 6,207) revealed that just 21% of patients with port-wine stains treated with pulsed dye laser achieved 75% to 100% clearance. The authors observed no improvement in outcomes over the past three decades despite technological improvements and changes in patient selection, indicating the need for further research of novel therapies (van Raath, 2019).

A systematic review examining 33 journal articles (n = 7,725 total patients, including 2,033 with port-wine birthmarks) demonstrated that good, excellent, or complete clearance was achieved in 17 of 19 studies (89%) for port-wine birthmarks, confirming pulsed dye laser as the gold standard treatment with particular benefit when initiated early in childhood (Hashemi, 2024).

Protocol changes such as varying interval time between pulsed dye laser treatments appears to have no effect on patient outcomes (Snast, 2021). Newer generations of pulsed dye laser, such as large spot pulsed dye laser, may offer improved effectiveness and efficiency but require higher quality studies to confirm improvement in outcomes (Sodha, 2023).

Port-wine stains - Comparative effectiveness

A systematic review and network meta-analysis of 27 randomized controlled trials (n = 1,033 observations across 19 treatment approaches) found that hemoporfin-mediated photodynamic therapy demonstrated significantly greater effectiveness compared to 595 nm pulsed dye laser (mean difference 0.97; 95% confidence interval 0.64–1.31), though it was associated with the highest likelihood of long-term adverse events. Pulsed dye laser remained superior to photodynamic therapy alone, intense pulsed light, and diode laser treatments (Nguyen, 2024).

For treating hypertrophic or resistant port-wine stains, a network meta-analysis of eight comparative studies (comprising 308 difficult-to-treat port-wine stains) found intense pulsed light (odds ratio 11.81, 95% confidence interval 2.15 to 64.89) and 585 nanometer long-pulsed dye laser (odds ratio 9.95, 95% confidence interval 1.75 to 56.62) were likely more effective than 585 nanometer short pulsed dye laser in further clearing lesions by more than 25%. The evidence was rated as having low certainty in the findings (Jamjanya, 2023).

Port-wine stains - Safety profile

Shi's systematic review and meta-analysis identified several acute and long-term complications associated with pulsed dye laser. The pooled complication rates were purpura (98.3%), edema (97.6%), crusting (21.5%), blistering (8.7%), hyperpigmentation (12.8%), hypopigmentation (0.9%), and scarring (0.2%). Long-term permanent complications occur infrequently, suggesting the importance of protective measures after treatment in preventing scar formation (Shi, 2023).

An analysis of 2,033 patients with port-wine birthmarks demonstrated excellent safety with only 16 patients (0.8%) reporting permanent adverse effects including scarring, keloids, or permanent pigmentation change, with no cases of blindness or serious injury reported (Hashemi, 2024).

Pain is a common side effect after laser therapy for dermatological procedures for conditions such as port-wine stains. A review of 32 randomized and nonrandomized controlled studies showed that noninvasive techniques, including pulsed dye laser, resulted in less pain than placebo, and topical anesthesia had better outcomes than skin cooling (Greveling, 2017).

Port-wine stains - Special populations

Eckembrecher (2023) summarized nine observational studies (n = 241) on pulsed dye laser for treating port-wine stains in patients with Fitzpatrick skin type IV–VI. While preliminary evidence suggests pulsed dye laser can be effective in patients with darker skin color, larger studies with diverse populations are needed to inform clinical practice, including use of adjunct treatments to mitigate adverse effects.

Infantile hemangioma - Efficacy and outcomes

A systematic review of 198 articles examining management of infantile hemangiomas confirmed that propranolol remains the first-line systemic treatment, with other beta-blockers such as nadolol, timolol, atenolol, acebutolol, and captopril showing comparable results to propranolol. Pulsed dye laser demonstrated response rates of 80-90% in numerous studies, with the authors concluding that a conventional combination of beta-blockers with laser therapy might represent first-line treatment to arrest growth of infantile hemangiomas (Jangid, 2024).

An analysis of 5,692 patients with hemangiomas demonstrated that good, excellent, or complete clearance was achieved in seven of seven studies (100%) for infantile hemangiomas, with only 11 patients (0.2%) reporting permanent adverse effects including scarring, keloids, or permanent pigmentation change, with no cases of blindness or serious injury reported (Hashemi, 2024).

A systematic review and network meta-analysis of 30 randomized trials assessing treatment for infantile hemangioma found laser with topical beta blockers had the greatest efficiency, and long-pulsed dye laser was the most effective. A higher dose and a longer treatment duration of oral propranolol achieved a higher success rate and increased side effects, while pulse dye laser with propranolol had the lowest incidence of adverse reactions (Fei, 2020).

Infantile hemangioma - Comparative effectiveness

A systematic review evaluating 20 studies (n = 2,856 patients) across various laser modalities found that 595-nm pulsed dye laser demonstrated high efficacy for superficial infantile hemangiomas with improvement rates up to 85%, while the 1064-nm neodymium-doped yttrium aluminum garnet laser was more effective for deeper lesions, achieving up to 87.57% regression. Combination therapies, particularly pulsed dye laser with propranolol or timolol, yielded superior outcomes compared to monotherapy, with higher regression rates, shorter treatment duration, and lower recurrence rates, while adverse effects were generally mild and infrequent across all laser modalities (Chaple Gil, 2025).

A Cochrane review of 28 studies (n = 1,728) found that compared with placebo, oral propranolol (3 milligrams per kilograms daily) for infantile hemangiomas probably improves clinician-assessed clearance with no difference in rates of serious adverse events, including no instances of bradycardia or hypotension. In two trials of children with superficial early hemangiomas in the pre-proliferative or early proliferative growth phase (n = 143); there were no differences in clearance outcomes, aesthetic appearance, or requirements for surgical correction when comparing pulsed dye laser to wait-and-see, although fewer adverse events were reported in the wait-and-see group (Novoa, 2019).

An Agency for Healthcare Quality and Research review of 148 studies of infantile hemangioma outcomes indicated that longer-pulse pulsed dye laser was generally more effective than observation (Chinnadurai, 2016b). This finding was consistent with a review of 29 studies, which also concluded that pulsed dye laser worked better than other laser therapies (Chinnadurai, 2016a). Reported side effects of laser treatment include purpura, swelling, blisters, hypopigmentation, bleeding, infection, and atrophic or hypertrophic scarring. Limitations of the evidence include small sample size, lack of comparative studies, and protocol variations. Nonetheless, laser treatment can be considered if there is a contraindication to systemic treatment (Chinnadurai, 2016a, 2016b).

Combination therapy

A meta-analysis analyzed efficacy of combined therapy with adrenergic beta-antagonist and lasers for infantile hemangiomas. Combined therapy with oral propranolol and lasers was superior to propranolol or lasers alone (both P < .00001). Combined therapy with topical timolol and lasers was superior to topical timolol (P < .00001) or lasers (P = .007) alone. Authors observed no differences in adverse effects (Chen, 2020).

A systematic review evaluating pulsed dye laser combined with sirolimus for treatment of capillary malformations analyzed nine studies (n = 58 patients). While five studies showed improvement in measured post-treatment parameters including shortened treatment time and less frequent dosing, three studies utilizing colourimetric analysis found no statistically significant differences between pulsed dye laser monotherapy and combination therapy with sirolimus. Seven studies reporting subjective clearance by photographic evaluation demonstrated statistically significant improvement, though considerable heterogeneity among studies requires larger studies with standardized protocols to establish conclusive safety and efficacy guidelines (Tan, 2024).

Cohort Studies

A multicenter retrospective cohort study examined 117 children with nonulcerated infantile hemangioma treated with pulsed dye laser. In the 99 (84.6%) participants who had late intervention (≥ 12 months of life), there was a mean 85% overall improvement compared to baseline (range 18% to 100%) measured by visual analog scale, mostly in erythema or telangiectasias, with a low incidence of adverse effects (6.1%) (Shah, 2023).

In 2025, we reorganized the findings section by evidence type rather than chronologically and incorporated five new systematic reviews (Chaple Gil, 2025; Hashemi, 2024; Jangid, 2024; Nguyen, 2024; Tan, 2024). No policy changes were warranted.

References

On July 25, 2025, we searched PubMed and the databases of the Cochrane Library, the U.K. National Health Services Centre for Reviews and Dissemination, the Agency for Healthcare Research and Quality, and the Centers for Medicare & Medicaid Services. Search terms were (“port wine stain (MeSH),” “hemangioma (MeSH),” “dye laser, pulsed (MeSH),” “port wine stain,” “propranolol,” “infantile hemangioma,” and “laser treatment.” We included the best available evidence according to established evidence hierarchies (typically systematic reviews, meta-analyses, and full economic analyses, where available) and professional guidelines based on such evidence and clinical expertise.

Brightman LA, Geronemus RG, Redy KK. Laser treatment of port-wine stains. *Clin Cosmet Investig Dermatol*. 2015;8:27-33. Doi: 10.2147/CCID.S53118.

Chaple Gil A, Caviedes R, Díaz L, Von Marttens A, Sotomayor C, Basualdo J, Beltrán V, Jorquera G, Bersezio C, Angel P, Cabello Ibacache R, Fernández E. Comparative evaluation of laser therapy for infantile hemangiomas: a systematic review of clinical outcomes and treatment considerations. *Photodiagnosis Photodyn The*r. 2025;53:104637. Doi:10.1016/j.pdpdt.2025.104637.

Chen X, Guo Y, Wang P, et al. Efficacy and safety of adrenergic beta-antagonist combined with lasers in the treatment of infantile hemangiomas: A meta-analysis. *Pediatr Surg Int*. 2020;36(10):1135-1147. Doi: 10.1007/s00383-020-04711-2.

Chinnadurai S, Sathe NA, Surawicz T. Laser treatment of infantile hemangioma: A systematic review. *Lasers Surg Med*. 2016;48(3):221-233. Doi: 10.1002/lsm.22455.(a)

Chinnadurai S, Snyder K, Sathe N, et al (eds.). Diagnosis and management of infantile hemangioma. Rockville (MD): Agency for Healthcare Research and Quality (US); 2016 Jan. Report No.: 16-EHC002-EF. *AHRQ Comparative Effectiveness Reviews No. 18*. https://www.ncbi.nlm.nih.gov/books/NBK344065/. Published 2016.(b)

Cunliffe T. Infantile haemangiomas (including strawberry naevi). Primary Care Dermatology Society. https://www.pcds.org.uk/clinical-guidance/strawberry-naevus. Last updated June 15, 2022. (a)

Cunliffe T. Port-wine stain (syn. naevus flammeus). Primary Care Dermatology Society. http://www.pcds.org.uk/clinical-guidance/port-wine-stain-syn.-naevus-flammeus#history. Last updated June 15, 2022. (b)

Darrow DH, Greene AK, Mancini AJ, Nopper AJ, Section on Dermatology, Section on Otolaryngology-Head and Neck Surgery, and Section on Plastic Surgery. Diagnosis and management of infantile hemangioma. *Pediatrics*. 2015;136(4):e1060-1104. Doi: 10.1542/peds.2015-2485.

Eckembrecher FJ, Eckembrecher DG, Camacho I, Shah H, Jaalouk D, Nouri K. A review of treatment of port-wine stains with pulsed dye laser in Fitzpatrick skin type IV-VI. *Arch Dermatol Res*. 2023;315(9):2505-2511. Doi: 10.1007/s00403-023-02640-3.

Fei Q, Lin Y, Chen X, et al. Treatments for infantile hemangioma: A systematic review and network meta-analysis. *EClinicalMedicine*. 2020;26:100506. Doi: 10.1016/j.eclinm.2020.100506.

Greveling K, Prens EP, Liu L, van Doorn MBA. Non-invasive anaesthetic methods for dermatological laser procedures: A systematic review. *J Eur Acad Dermatol Venereol.* 2017;31(7):1096-1110. Doi: 10.1111/jdv.14130.

Hashemi DA, Tao J, Wang JV, Geronemus RG. The 595-nm wavelength pulsed dye laser for pediatric port-wine birthmarks and infantile hemangiomas: a systematic review. *Lasers Surg Med*. 2024;57(9). Doi: 10.1002/lsm.23864.

Jamjanya S, Vejjabhinanta V, Tanasombatkul K, Phinyo P. Comparative effectiveness among available treatments in difficult-to-treat port-wine stains (PWS): A network meta-analysis of observational evidence. *J Dermatolog Treat*. 2023;34(1):2231582. Doi: 10.1080/09546634.2023.2231582.

Jangid SD, Madke B, Bhatt D, Singh AL. A systematic review on management of infantile hemangiomas: how far we have reached in this past decade. *Indian J Paediatr Dermatol*. 2024;25(3):188-194. Doi:10.4103/ijpd.ijpd_65_24.

Krowchuk DP, Frieden IJ, Mancini AJ, et al, Subcommittee on the Management of Infantile Hemangiomas. Clinical practice guideline for the management of infantile hemangioma. *Pediatrics*. 2019;143(1):e20183475. Doi: 10.1542/peds.2018-3475.

Nguyen V, Hochman M, Mihm MC, Nelson JS, Tan W. The pathogenesis of port wine stain Sturge Weber Syndrome: Complex interactions between genetic alterations and aberrant MAPK and PI3K activation. *Int J Mol Sci*. 2019;20(9):2243. Doi: 10.3390/ijms20092243.

Nguyen L, Sorbe C, Schoen G, et al. Laser and light-based treatments for port-wine birthmarks – a systematic review and network meta-analysis. *J Dtsch Dermatol Ges*. 2025 Mar;23(3):293-301. Doi: 10.1111/ddg.15612

Novoa M, Baselga E, Beltran S, et al. Interventions for infantile haemangiomas of the skin: Abridged Cochrane systematic review and GRADE assessments. *Br J Dermatol*. 2019;180(3):527-533. Doi: 10.1111/bjd.17407.

Randel A. American Academy of Pediatrics releases report on infantile hemangioma. *Am Fam Physician*. 2016;93(6):526-527. https://www.aafp.org/pubs/afp/issues/2016/0315/p526.html.

Sabeti S, Ball KL, Burkhart C, et al. Consensus statement for the management and treatment of port-wine birthmarks in Sturge-Weber Syndrome. *JAMA Dermatol*. 2021;157(1):98-104. Doi: 10.1001/jamadermatol.2020.4226.

Shah SD, Mathes EF, Baselga E, et al. Multicenter retrospective review of pulsed dye laser in nonulcerated infantile hemangioma. *Pediatr Dermatol*. 2023;40(1):28-34. Doi: 10.1111/pde.15132.

Shi MD, Yang K, Li SB, Zhao Q, Huo R, Fu C. Complication rates and safety of pulsed dye laser treatment for port-wine stain: A systematic review and meta-analysis. *Lasers Med Sci*. 2023;39(1):16. Doi: 10.1007/s10103-023-03961-5.

Siegel DH. PHACE syndrome: Infantile hemangiomas associated with multiple congenital anomalies: Clues to the cause. *Am J Med Genet C Semin Med Genet*. 2018;178(4):407-413. Doi: 10.1002/ajmg.c.31659.

Snast I, Lapidoth M, Kaftory R, et al. Does interval time between pulsed dye laser treatments for port-wine stains influence outcome? A systematic review and meta-analysis. *Lasers Med Sci*. 2021;36(9):1909-1916. Doi: 10.1007/s10103-021-03264-7.

Sodha P, Wang JV, Aboul-Fettouh N, et al. Largest comparative analysis: Novel large spot size 595 nm, high-energy, pulsed dye laser reduces number of treatments for improvement of adult and pediatric port wine birthmarks. *Lasers Surg Med*. 2023;55(8):741-747. Doi: 10.1002/lsm.23693.

Tan IJ, Truong TM, Pathak GN, et al. Evaluating the clinical efficacy of pulsed dye laser with sirolimus for treatment of capillary malformations: a systematic review. *Skin Health Dis*. 2024 Jan;4(1):e333. Doi: 10.1002/ski2.333.

Van Raath MI, Chohan S, Wolkerstorfer A, van der Horst CMAM, Storm G, Heger M. Port wine stain treatment outcomes have not improved over the past three decades. *J Eur Acad Dermatol Venereol*. 2019;33(7):1369-1377. Doi: 10.1111/jdv.15599.

Wildgruber M, Sadick M, Müller-Wille R, Wohlgemuth WA. Vascular tumors in infants and adolescents. *Insights Imaging*. 2019;10(1):30. Doi: 10.1186/s13244-019-0718-6.

Policy updates

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