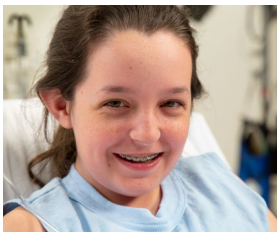
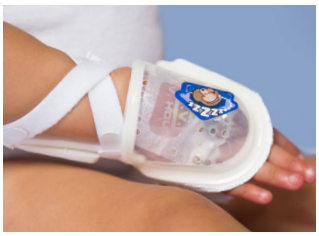
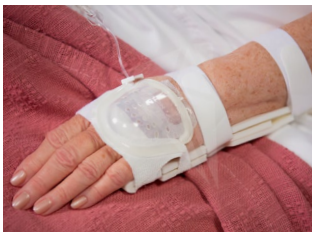
DELIVERING ON THE PROMISE OF IMPROVED PATIENT SAFETY AND INCREASED NURSE EFFICIENCY




I.V. HOUSE®
Protection Over and Above®

Table of Contents

Introduction

Over the last five years we've seen a staggering amount of research into the causes and prevention of complications in peripheral intravenous catheters, previously one of the most under-recognized patient safety issues.[1] In a recent survey of nurses and vascular access specialists, 68% said accidental dislodgment of PIVs occurs daily or often, and 95% identified PIVs as the most commonly dislodged device. This is a safety concern for their facilities.[2]

For 30+ years, I.V. House has been laser-focused on reducing patient harm and increasing nurse efficiency. The results from recent trials prove the TLC Splint®, I.V. House UltraDome®, and I.V. House UltraDressing® help improve patient safety, especially when used with complementary products such as ultrasound-guided PIV insertion and IV site monitoring systems. Patient and parent/guardian education about early warning signs of complications also helps improve outcomes.[3]

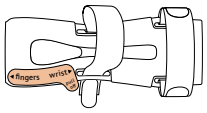
- Using the TLC Splint and I.V. House UltraDome, a large pediatric hospital in the Northeast saw a **30% reduction in severe infiltrates, a 42% reduction in moderate infiltrates, and a 55% reduction in mild infiltrates**.
- A Midwest hospital saw a **20% reduction in pediatric patient harm** with moderate to severe infiltrates.
- Another Midwest hospital saw a **17% decrease in infiltrates** after using I.V. House products for approximately a year and a half.
- In a West Coast hospital, the **I.V. House UltraDome and TLC Splint** were part of a bundle that **reduced IV catheter loss from 21.0% to 2.7%**, extending dwell times.
- Nurses in a hospital in the Southeast gave high marks to I.V. House products. **95% of nurses found the products easy to apply,** but more importantly, **86% said they made it easy to assess the IV insertion site**.
- The conclusion of a randomized controlled trial stated: **"The I.V. House UltraDressing is a useful device that can be used to increase catheter dwell time and protect and stabilize PIVCs in pediatric patients."**[4]

Finally, the results of a trial at St. Louis Children's Hospital showed **ZERO IV infiltrates in patients wearing the TLC Splint** compared to 12 IV infiltrates in the patients wearing traditional armboards.

 *Endnotes available on pages 43–44

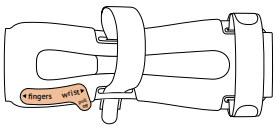
I.V. House Products at a Glance

TLC® Wrist Splint with Straps

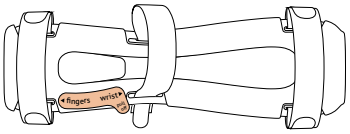


TLC Wrist Splint is also available in a Basic version without straps.

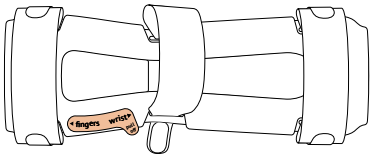
S **939S-Ultra**
Infants 0–12 months, or 2.5–12 kg



M **939M-Ultra**
Toddlers 12–36 months, or 9–15 kg

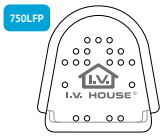


L **939L-Ultra**
Children 3–10 years, or 12–41 kg



XL **939XL-W-Ultra**
Youth/Adults 10 years and up, or over 40 kg

I.V. House UltraDome®

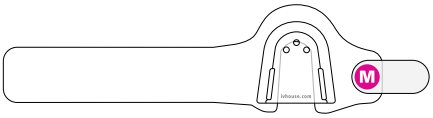


750LFP Large Dome

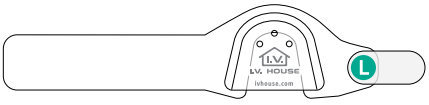
727SFP Small Dome

Hand, forearm, AC, foot/ankle, scalp, or other peripheral IV

330 Series I.V. House UltraDressing®



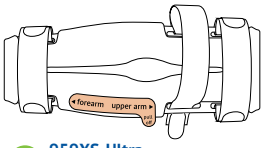
330M Neonates, infants, toddlers, and children*



330L Infants, toddlers, and children*

*May be used on hand, forearm, AC, foot/ankle, or other peripheral IV.

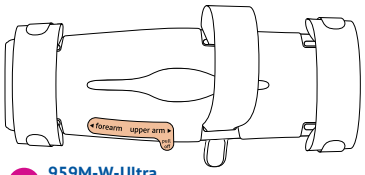
TLC® Elbow Splint with Straps



Small and Medium sizes also available in a Basic version without straps.

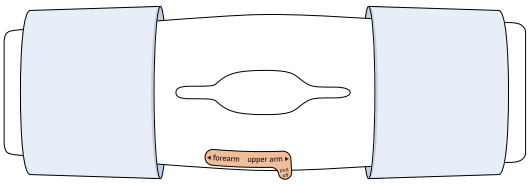
XS **959XS-Ultra**
Newborns 0–4 months, or 2.5–7 kg

S **959S-Ultra**
Infants 4–12 months, or 6–12 kg



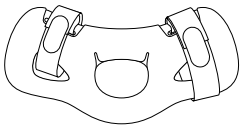
M **959M-W-Ultra**
Toddlers 12–36 months, or 9–15 kg

L **959L-W-Ultra**
Children 3–10 years, or 12–41 kg

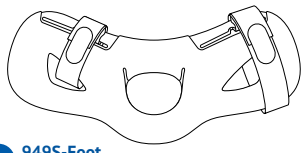


XL **959XL-Ultra**
Youth/Adults 10 years and up, or over 40 kg
Fits arms 24–34 cm circumference at upper arm

TLC® Foot Splint



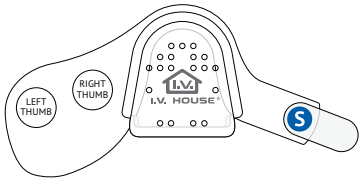
XS **949XS-Foot**
Newborns 0–4 months, or 2.5–7 kg



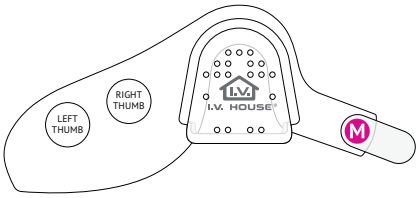
S **949S-Foot**
Infants 4–12 months, or 6–12 kg
May fit larger infants.
Nonambulatory infants only.

730 Series I.V. House UltraDressing®

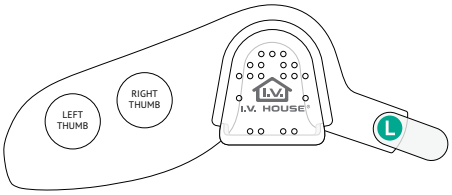
Use hand sizing chart included in I.V. House UltraDressing box for proper fit.



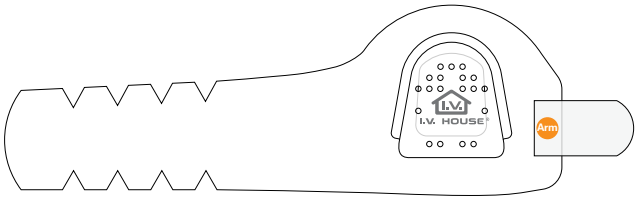
730S Small hand—refer to sizing chart



730M Medium hand—refer to sizing chart



730L Large hand—refer to sizing chart



730Arm All ages; Forearm, AC, foot/ankle, hand, or other peripheral IV

REV 2024-02-28

*Endnotes available on pages 43–44

The Current State of IV Therapy

Insertion of a peripheral intravenous (PIV) device is the most common invasive medical procedure performed today[5] with more than 330 million[6, 7, 8] PIV catheters sold each year in the United States. Nurses are the largest group of clinicians responsible for the placement and management of PIV therapies[9] and play a vital role[10, 11] in the early detection of complications in IV insertion sites.

Although studies show greater success at first-time insertions[12, 13] when highly skilled clinical staff is used for IV insertion,[14] training for this important task is lacking.[15] In one survey, 92% of nurses admitted to only spending between zero to five hours on PIV education. In another study, 11% of respondents said they developed their PIV skills through the "see one, do one, teach one" method. This lack of adequate education is cited as a top reason for complications and early PIV catheter removal. I.V. House products are designed to make it faster and easier to thoroughly assess the IV insertion site[16, 17,] and help nurses take a proactive and intentional approach to vein preservation.

The Michigan Appropriateness Guideline for Intravenous Catheters (MAGIC) and *The Michigan Appropriateness Guide for Intravenous Catheters in Pediatrics (miniMAGIC)* established recommendations that prioritize vessel preservation, patient harm minimization, and inclusion of patient preference in device selection.[18,19, 20] Currently, this process is highly variable and often defaults to institutional culture and practice.[21, 22] IV access is established in up to 90% of acute care patients with overall IV catheter failure rates of nearly 70%. Catheter failure is considered to have occurred when an IV catheter stops effectively or safely working before its intended dwell time, the traditional 72–96-hour[23, 24, 25] dwell time limit, or when removal is clinically indicated.[26, 27, 28, 29]

A recent study found that 24.8% of peripheral intravenous catheters (PIVCs) inserted in the pediatric emergency department failed due to infiltration, accidental dislodgment, blockage, phlebitis, or other causes.[30, 31, 32] In a study of adult patients, 20% of IV catheters failed; infiltration was cited as the primary reason.[33] Extravasation of IV fluids into the subcutaneous tissues can cause severe complications, including tissue necrosis,[34, 35] and occurs in up to 11% of children and 22% of adults. In a time when hospitals are facing reduced reimbursements based on Hospital Consumer Assessment of Healthcare Providers and Services (HCAHPS) survey scores,[36] it is imperative to reduce the number of Hospital Acquired Conditions (HACs), and their associated costs, including time-consuming, painful IV restarts.[37]

70%–90%

of hospitalized patients receive IV therapy[38]

90%

of hospitalized children will experience a needlestick or "poke;" this is the number one fear for pediatric patients[18]

50%–69%

of IV catheters in hospitalized patients fail[39, 40]

 *Endnotes available on pages 43–44

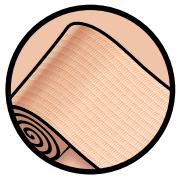
IV Protection Considerations

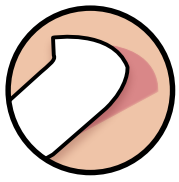
I.V. House products help reduce the risk of IV-related injuries by protecting the IV insertion site while making routine assessment easier and more efficient.

- 12–26% first attempt catheter insertions fail in adults[40]
- 24–54% first attempt catheter insertions fail in children[41]
- 72% of IV insertions are successful on the first or second attempt[42]
- 28% of IV insertions require more than three attempts[42]
- 2.18 is the average number of sticks it takes to insert a patient IV[43]
- It takes 20–30 minutes to start a pediatric IV and more than one person is often needed[42]
- Average dwell time is 29 hours; 25% of catheters fail by 2.4 days[30]

$23 – $41

per PIVC attempt including staff time + consumables [44,61]





Catheter Movement

Pistoning,[45] or movement of the catheter back and forth inside the vein,[46] can cause unintentional damage to the vein and tissue surrounding the blood vessel, leading to complications such as phlebitis, infiltration, and extravasation. Pistoning can allow migration of organisms along the catheter, into the systemic circulation increasing the risk of catheter-related bloodstream infections, which are now considered preventable HACs. Movement is more likely to occur in areas of flexion.

Dislodgment

When an IV insertion site is not protected, the catheter can become dislodged accidentally or be removed by a patient. Dislodgment is the second most common complication in adults.

Assessment

Complications with the IV insertion site or underside of the extremity with the IV insertion may be hidden by tape,[47] rolled gauze, bandages, self-adherent wrap, or conventional armboards. The process of effectively monitoring the IV insertion site can prevent potential injuries that lead to preventable HACs.

Tape Irritation

Medical adhesive-related skin injuries and epidermal stripping caused by tape removal are painful and can increase the risk of infection, especially for elderly and pediatric patients. When there is a need for more than one IV insertion, the pain and irritation associated with tape are multiplied.

Biomechanics of the Hand

During a period of immobilization, the resting length of the hand's ligaments and muscles change. The functional hand position for IV therapy provides the best balance of resting length and force production so the hand can function when the patient mobilizes it again.[48] Similar changes can also occur in the foot and elbow joints during periods of immobilization.

*Endnotes available on pages 43–44

Common Issues In Peripheral IV Therapy

Difficult Intravenous Access

Although there is no consensus on the definition of difficult intravenous access (DIVA), or validated DIVA tool, it is often described as non-visible and non-palpable veins.[49] A history of IV injections, chemotherapy, chronic kidney disease,[50] obesity, adiposity, age, and history of prematurity can all contribute to DIVA. Up to one-third of adults and half of pediatric patients are reported to have DIVA, which can result in multiple insertion attempts and cause delay in treatment.

Hospitals that employ DIVA scoring systems[51, 52] can reduce the number of insertion attempts by escalating care to include utilizing new technology such as ultrasound-guided PIV placement[53, 54, 55, 56] and assigning the task to experienced highly skilled inserters.[57, 58, 59, 60, 61] Additionally, patients' advice about their level of difficulty and "best vein" should be taken seriously to increase insertion success. In one survey, less than half of the respondents reported a formal algorithm or criteria in place to escalate a patient who needed an expert PIV inserter.[62] Placement of PIVCs in high flexion areas[63] (such as the elbow, wrist, or feet in infants) is common in patients with DIVA, which increases the risk of phlebitis, thrombosis, and other complications. Standardization of practices, development of a validated DIVA tool, creation of PIVC bundles[64, 65] with all necessary equipment—including armboards, IV catheter securement devices, and secondary securement devices—are required to achieve consistent PIVC insertion success in these patients.

Lack of PIVC Nurse Expertise

Peripheral IV catheters are the most commonly used vascular access devices,[66] yet 50% require multiple attempts and failure rates remain high[67, 68] (69%). Hospitals treat PIVC insertion as commonplace, therefore they do not prioritize training for insertion expertise, which can have serious consequences. Patients with DIVA continue to require multiple attempts, which is particularly stressful for the nurse, patient, and the patient's caregiver.[69] Many risk factors associated with PIVC failure can be directly related to the insertion of the catheter (e.g., catheter gauge, length, and insertion site).[70] Several studies indicate that assigning PIVC placement to expert inserters increases first-time insertion success[71] and reduces complications that lead to early removal of the PIVC. Factors related to first-time insertion success include clinician confidence[72] and insertion experience. In one study, 54% of health care institutions spent between one and five hours on PIV training, while 38% spent less than one hour. Further, PIV therapy is one of the top three skills that nurses felt uncomfortable performing, which is understandable when up to 57% of nurses said they never had the opportunity to place a PIV catheter while in school. IV therapy education should include anatomy and physiology of the vascular system, types and designs of PIV catheters, venous visualization techniques, PIV site care and maintenance, PIV complications, patient education, and legal implications. Improving education levels may reduce the number of complications caused by PIVC insertion, decrease the number of IVs used, and lower the number of insertion attempts per patient, reducing both costs and patient anxiety. It's imperative that hospitals standardize practices around IV therapy starting with nurse education and skill development.

Nurse Hesitancy

Adopting new IV therapy practices and technology is challenging for many hospitals. Changes in the way care is delivered can be stressful to nurses in a clinical setting, making them hesitant to adopt new procedures.[73] If they feel they don't have the proper training, nurses will often default to previous institutional culture and practices. Nurses have expressed concern that utilizing new practices increases patient and clinician worry unless they have been given adequate education and resources prior to practice implementation. Eighty-seven percent of nurses in one survey

 *Endnotes available on pages 43–44

admitted to asking a coworker for assistance in using new devices or technologies due to the lack of proper training.[74] These barriers should be addressed through education before a new nursing practice can be implemented.[75,76] Other recommendations to ensure the successful introduction of new technologies and procedures include involving nursing staff from the beginning, keeping them engaged throughout the process, setting up a trial, allowing nurses to participate in evaluations, and following up to ensure staff is adapting.

Patient & Caregiver Education

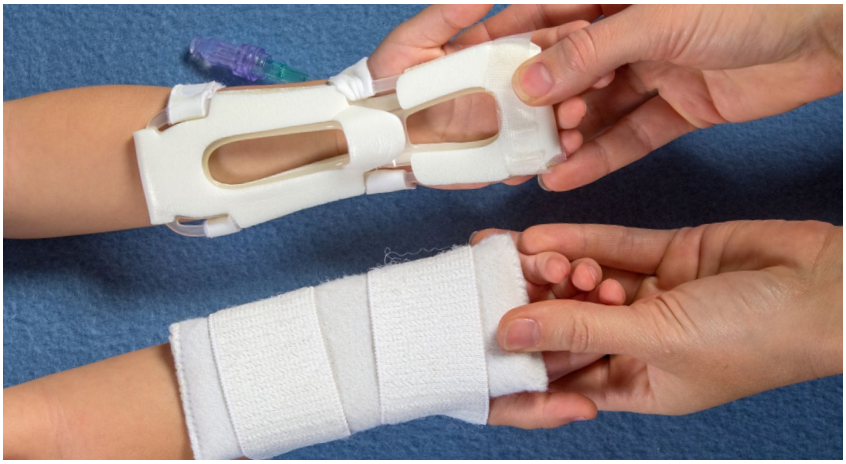
Early identification and quick response to IV therapy complications are imperative to preventing patient harm.[77] Although clinicians are tasked with IV catheter assessments, hourly for some patients, it is known that parents and family members make efforts to care for their loved ones by learning about the patient's condition, its treatment, and signs that the condition is worsening.[78] Because parents, guardians, and other family members often visit daily, they can be integral to the health care team. A 2015 study showed a significantly lower incidence of pediatric IV infiltrations when patient guardians were educated about the warning signs of IV therapy complications and involved in frequent observation of IV sites.[79,80] Mnemonic devices such as Touch, Look, and Compare,[81] can help patient caregivers remember how to check for early warning signs of complications such as changes in color, temperature, or size when compared to the opposite extremity. A Midwestern pediatric hospital created an IV therapy bundle that included a parent education poster to hang on each IV pole and reported approximately 90 fewer children[82] were harmed by moderate to severe infiltrates, far exceeding their goal.

Documentation

Documentation of hourly IV site checks protects the patient and the nurse.[83] Nurses learn in school, "If it isn't documented, it wasn't done." In a 2019 research article, 26.8% of IV site checks were not documented, which was the most prevalent overall problem. In addition, "55.1% of the PIVCs remained in place despite insertion in objectionable environments." Almost one-third of all IVs were missing documentation and more than 50% needed attention. This is unacceptable nursing practice. TLC Splints improve the ability to assess the IV site. When nurses can Touch, Look, and Compare the IV insertion site and surrounding tissue with the opposite extremity to check for signs of complications, they can complete their routine assessments more efficiently.

From a Mother's Perspective

"The biggest lesson for us from Everly's hospital experiences is how important it is for parents to be their children's voice. When it comes to IVs now, I'm much more involved in the process and I check all of them."[84]



The Use of Conventional Armboards

If an area of flexion is not properly supported, participation in daily activities can cause an IV catheter to irritate the vein and lead to infiltration. Medication absorbed into non-vascular tissue causes swelling, which in extreme cases can lead to compartment syndrome.[85] The tip of the catheter may puncture the posterior wall of the vein, infusing the surrounding tissue with fluid.[86] Gravity pulls the fluid to the palm and, if undetected, can cause serious injury. The use of short catheters may also contribute to the ease of the catheter slipping out of the vein, causing infiltration.

Difficult Assessment

Solid armboards and immobilizers, such as No-Nos® or Comfort Sleeves, obscure the IV insertion site and surrounding anatomic structures, preventing easy assessment. The board or immobilizer must be removed each time to properly inspect the extremity, up to 24 times a day for pediatric and neonatal patients, a time-consuming process. Researchers are calling on nurses to be vigilant in their IV assessments and point to the lack of assessment as a contributing factor that leads to patient injury.[87]

Issues for Patients

Manipulation of the IV insertion site causes patient anxiety and requires an excessive amount of the nurse's time. If the IV insertion site is in an area of flexion, conventional armboards immobilize the extremity, but do not support it ergonomically. Nurses must either use a flat board or manually bend the board to approximate the right fit. Flat armboards or those with sharp edges can cause contractures, unnecessary discomfort, pressure injuries, and skin tears. Neural injuries can occur if the armboard is applied incorrectly.

Awkward Construction

Many armboards contain either cardboard that can break easily, or metal, which cannot be used in an MRI environment. Traditional armboards also require excessive tape to effectively secure the hand, wrist, elbow, or ankle and foot, restricting circulation and causing skin irritation. Others have straps that are so wide they obscure the IV insertion site, preventing easy assessment.

Peripheral IV catheters have been associated with the development of pressure injuries, especially in active patients. While immobilizing the relevant joint helps prevent accidental removal, traditional armboards do not address the development of pressure ulcers. "Newer ergonomic-focused PIVC limb boards and intravenous line protectors are available internationally and may better distribute pressure across the limb, subsequently reducing the likelihood of PI (pressure injuries) development."[97]

24x *per patient per day*

The Infusion Nurses Society Standards of Practice recommends hourly inspection for neonatal or pediatric patients. Critically ill, sedated patients, or those with cognitive deficits also require assessment every one to two hours.

"I want nurses to be able to get back to the science and art of their nursing practice. By creating see-through openings in the TLC® Splint, the skin and surrounding tissue under the board is visible, so the splint doesn't need to be removed for hourly checks, giving time back to the nurse."

- Lisa Vallino, CEO, I.V. House, Inc.

Reports indicate that incomplete assessment, or failure to frequently assess, monitor, or maintain the IV insertion site is likely to result in a serious adverse event for the patient. 13.2% of closed claims were due to failure to appropriately monitor the patient, which resulted in severe complications, including compartment syndrome.[88]

For patient comfort and safety, all I.V. House Products are:

SINGLE USE · MRI SAFE · LATEX FREE · DEHP FREE · BPA FREE

 *Endnotes available on pages 43–44

Cost Implications

In addition to increasing patient satisfaction, I.V. House products help reduce hospital costs by decreasing the incidence of common complications that often result in extended hospital stays.

A recent report showed that annual PIVC sales exceed 350 million in the United States. Around 37 million patients are hospitalized in the U.S. each year, meaning hospitals use an average of 10 PIVCs per patient admission, indicating high failure rates and increased costs.[89]

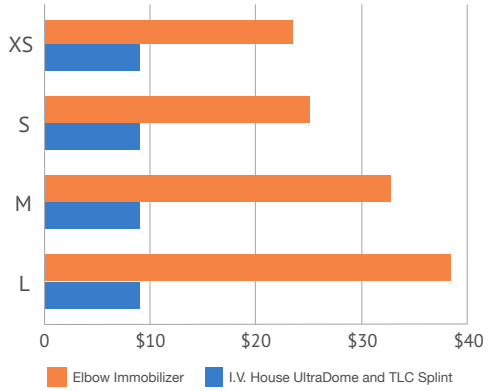
In addition, the financial cost for premature PIVC removal is conservatively estimated at $1.5 billion annually in the U.S.[90] Patients with PIVC failure have prolonged, more expensive hospitalizations averaging two additional days of hospitalization at the cost of over $3,000.[91]

Hospitals using I.V. House products, including the TLC® Splint, I.V. House UltraDome®, or I.V. House UltraDressing®, report up to a 20% reduction in IV therapy complications, including moderate to severe infiltrates. In addition, I.V. House products are less expensive than other immobilization devices that obscure the IV insertion site and surrounding tissue making visual and manual assessment more difficult.

55%–67%

cost reduction when using I.V. House products vs. immobilizers

Elbow Immobilizers vs. I.V. House Products



Typical Immobilizer	Price Range*	I.V. House Joint Stabilization and IV Insertion Site Protection	Price Range	Savings
Immobilizer Elbow Peds Extra Small	$19–$25	XS (Newborn) Elbow Splint and 727SFP UltraDome	>$10	55%
Immobilizer Elbow Peds Small	$19–$25	Small (Infant) Elbow Splint and 750LFP UltraDome	>$10	67%
Immobilizer Elbow Peds Med	$22–$32.50	Medium (Toddler) Elbow Splint and 750LFP UltraDome	>$10	57%
Immobilizer Elbow Md/Lg	$25–$38	Large (Child) Elbow Splint and 750LFP UltraDome	>$10	63%

Average = 61% reduction in costs

AWARD-WINNING DESIGN

I.V. House, Inc. has earned six awards in the medical technology arena: The TLC Splint won a 2019 Silver Edison Award for innovation, and two Good Design Awards (2019 and 2015), given by The Chicago Athenaeum Museum of Architecture and Design. The I.V. House UltraDressing won three awards including the prestigious Medical and Scientific Equipment Gold IDEA winner (Industrial Design Excellence Award), presented by the Industrial Designers Society of America and sponsored by Business Week Magazine.

The TLC Splint Difference

I.V. House recognized that both nurse efficiency and patient safety could be improved by reinventing the armboard and spent more than three years working with leading experts in ergonomic design. Consulting with nurses along the way, I.V. House creates products that prevent common injuries associated with traditional armboards.

In recent trials, hospitals reported a 17–40% reduction in patient harm, including grades 3–4 infiltrates, and significant reduction in accidental dislodgment, resulting in extended dwell times. A large pediatric hospital used a maintenance bundle that included the TLC Splint. Peer-to-peer rounding with IV team nurses and unit nurses resulted in 90 less moderate to severe infiltrates when compared to the previous year,[92] exceeding the 20% reduction goal.

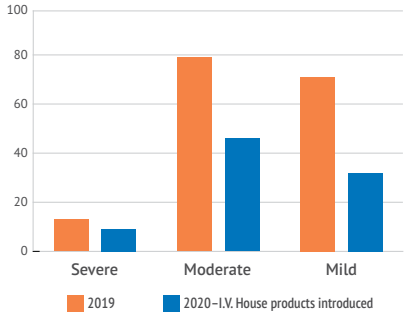
Protection for Nurses

Openings on the TLC Splint allow nurses to Touch, Look, and Compare the IV insertion site with the opposite extremity. Nurses have a 360-degree view, plus the ability to manually check for signs of complications such as a change in temperature or swelling. According to an article in the *Journal of Infusion Nursing*, errors associated with IV administration can result in life-threatening or fatal outcomes leading to malpractice claims,[93] with nurses being named as defendants in such lawsuits in increasing numbers.

Safety for Patients

Continuous movement by the patient can cause the catheter to irritate the vein. The short length of PIVCs may also contribute to the migration of the catheter out of the vein and infiltration of IV fluids. Prevention of movement and early detection are keys to decreasing patient harm. Catheter stabilization becomes a central means to improve outcomes. The TLC Splint is ergonomically engineered to fit the anatomy of the wrist, elbow, or foot and ankle. This provides better anatomical alignment for the IV catheter in the blood vessel. All patients are at risk for suffering infiltration injury, but the pediatric population is especially vulnerable because of their smaller, weaker blood vessels, immature skin, lack of subdermal fat, and constant movement.[94]

17%–40%
reduction
in patient harm



In the first year after adopting I.V. House products, one hospital saw a 30% reduction in severe infiltrates, a 42% reduction in moderate infiltrates, and a 55% reduction in mild infiltrates.

 *Endnotes available on pages 43–44

Precision Design

The TLC Splint, available for the wrist, elbow, and foot, is made to fit patients in the 5th to 95th percentile size range—from children through adults. The lateral cupped shape mirrors the anatomy to effectively center the extremity on the splint. The proximal and distal ends are tapered and curved to prevent edges digging into the patients skin, reducing discomfort, abrasions, and localized pressure ulcers caused by traditional armboards. The TLC Splint is the only armboard that uses Human Factors and Ergonomics to create a product to fit the anatomy of each patient, while improving clinician workflows.

The soft straps of the TLC Splint are easy to apply and adjust for each patient to prevent restriction of circulation. The straps are breathable, resist migration or slipping, and wick away perspiration. Alternative strap configurations allow nurses to avoid obstructing the view of the IV insertion site.

The TLC Splint is MRI Safe. Materials are nonconductive, nonmagnetic, insulated, and will not become hot during an MRI scan.

Compliance with Best Practices Supports Hourly TLC Checks

The INS recommends a visual inspection of the IV insertion site every four hours for patients who are able to notify the nurse of any pain, swelling, and redness; and every hour for pediatric and neonatal patients and those who are critically ill. The Touch, Look, and Compare assessment tool provides nurses with a quick reference to remember when monitoring the IV insertion site for complications associated with IV catheters such as phlebitis, infiltration, extravasation, infection, and nerve damage. Signs of redness, tenderness, swelling, drainage, and/or the presence of paresthesia, numbness, or tingling should be monitored and remedied.

Promising Results

A hospital in the Northeast has shared the following, "The data from 2019 compared to the internal data for 2020 (when we went live in Jan 2020) supports the use of the TLC Splints in decreasing peripheral IV infiltrations and extravasations (PIVIE)."

TLC

Touch, Look, and Compare

Originally developed by a large pediatric hospital, I.V. House has adopted the Touch, Look, and Compare process to provide nurses with a memorable method for evaluating a patient's IV insertion site.

Touch

IV insertion site should feel soft, warm, dry, and pain-free[81]

Look

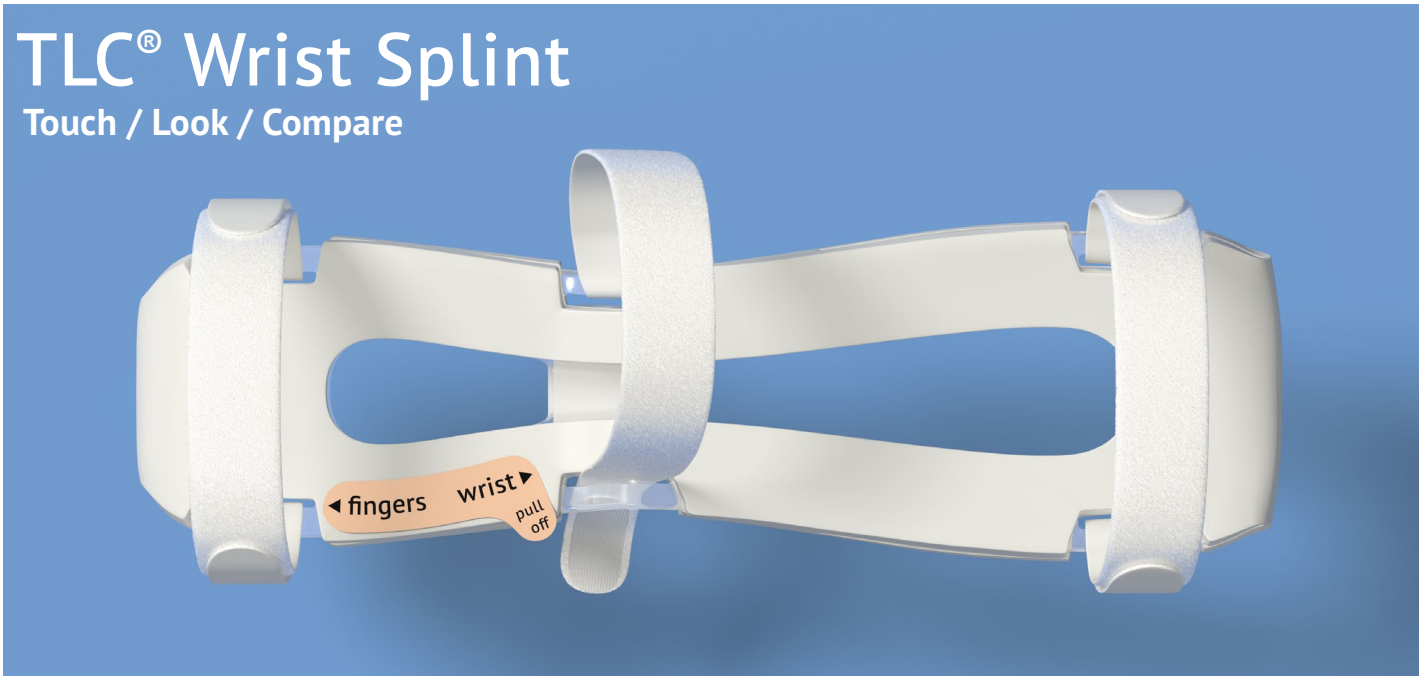
IV insertion site should be uncovered, dry, and without redness[81]

Compare

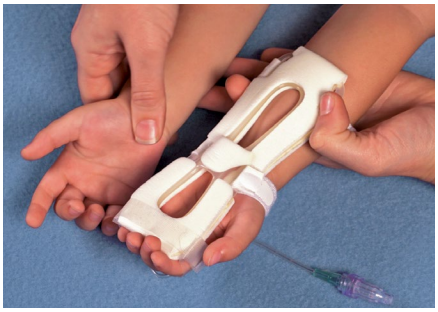
IV insertion site and surrounding area should be the same size as the opposite extremity and without swelling[81]

TLC® Wrist Splint

Touch / Look / Compare



The TLC Wrist Splint is designed using Human Factors and Ergonomics to create an innovative device that improves patient safety and increases nurse effectiveness by making hourly IV assessments easier and more efficient.[95] The joint stabilization provided by the TLC Wrist Splint holds the wrist, forearm, and hand in the ideal orientation to optimize IV therapies.[96]



Touch / Look / Compare

The slight bend at the wrist of the TLC Wrist Splint creates minor flexion, which provides better anatomical alignment for the IV catheter in the blood vessel. The device is available in four sizes to fit pediatric through adult patients. The unique shape prevents unnecessary stretching of the ligaments. The fingers extend over the edge of the TLC Splint, allowing patients to participate in day-to-day activities, including self-care.

The TLC Splint conforms to **INS Standard 39** on joint stabilization that states armboards or splints are padded, support the area of flexion, and are applied in a manner that allows for thorough assessment of the IV insertion site.

No-Nos, welcome sleeves, Coban, and gauze all obscure the view of the IV catheter and adjacent anatomic areas.

See-through openings on the TLC Splint allow for easy visual and manual assessment of the extremity. The Velcro® straps secure the splint to the arm and provide a clear, unobstructed view of the IV insertion site. The TLC Wrist Splint is also available without straps.

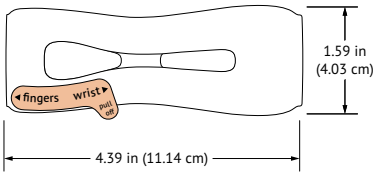
For active patients, the design of the TLC Wrist Splint minimizes friction issues that cause skin abrasions or localized pressure ulcers.[97] The soft foam padding provides added comfort for patients of all ages. Continuous movement by pediatric patients can also cause irritation in the vein. In addition, the short length of peripheral IV catheters may contribute to catheter dislocation and subsequent infiltration of fluids and/or medications.

TLC Wrist Splint Features

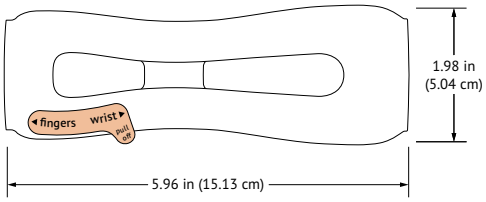
- Easily assess palmar side of hand and forearm through openings.
- Cupped shape supports forearm and centers arm on splint.
- Eliminates irritation and tissue damage caused by rough edges found on some traditional armboards.
- Soft straps are easy to apply and adjust to prevent restriction of circulation.
- Adjustable Velcro® tabs eliminate over-taping of fragile skin.
- Maximizes dwell time, minimizes the need for painful, traumatic restarts.
- Universal design fits either hand. Available without straps.
- Designed for use with any I.V. House site protection product.

I.V. House TLC® Wrist Splints > Product Specifications

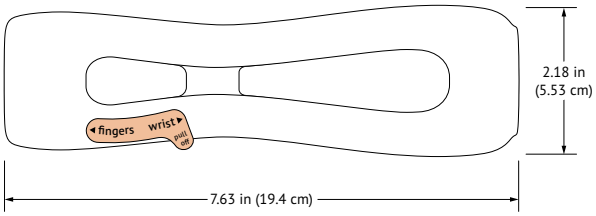
Basic



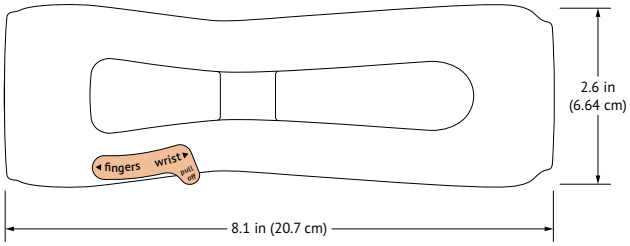
939S-Basic
Infants 0–12 months, or 2.5–12 kg



939M-Basic
Toddlers 12–36 months, or 9–15 kg

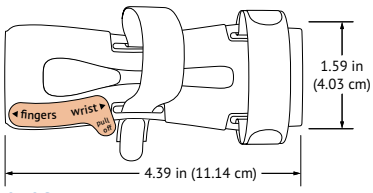


939L-Basic
Children 3–10 years, or 12–41 kg

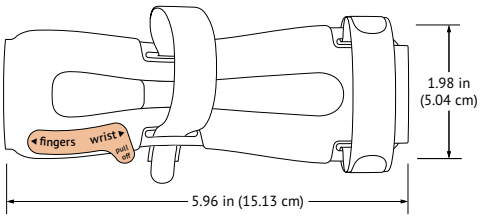


939XL-Basic
Youth/Adults 10 years and up, or over 40 kg

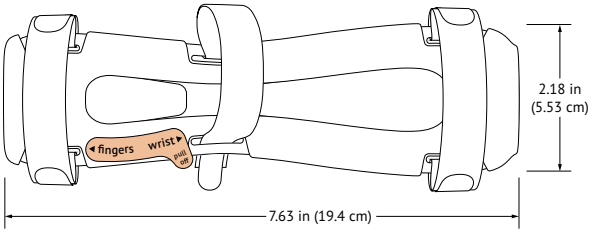
Ultra



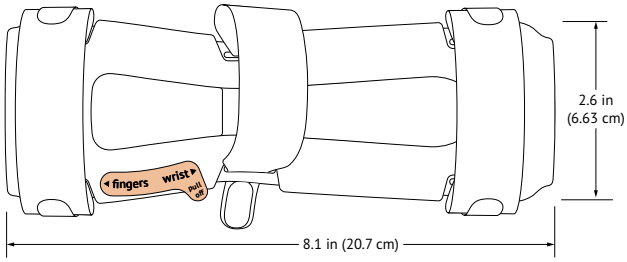
939S-Ultra
Infants 0–12 months, or 2.5–12 kg



939M-Ultra
Toddlers 12–36 months, or 9–15 kg



939L-Ultra
Children 3–10 years, or 12–41 kg

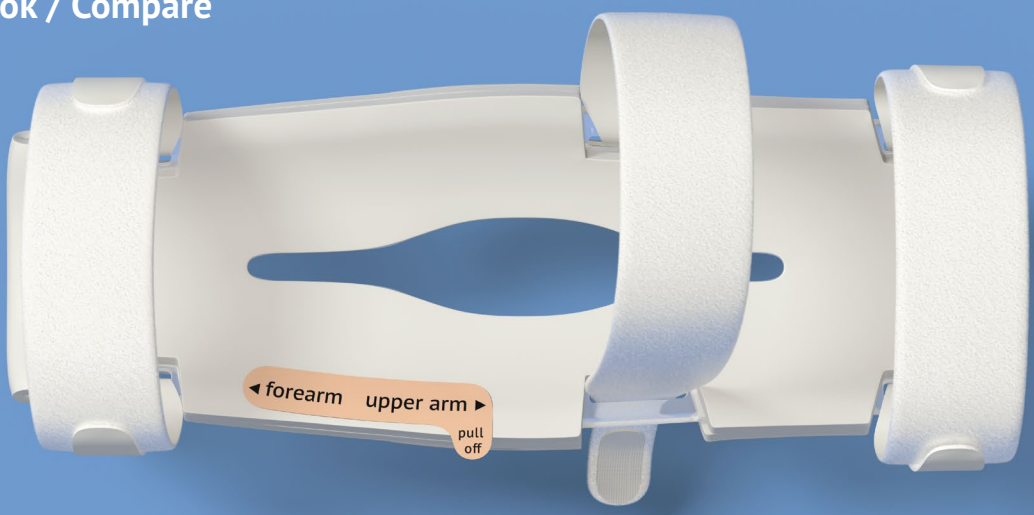


939XL-W-Ultra
Youth/Adults 10 years and up, or over 40 kg

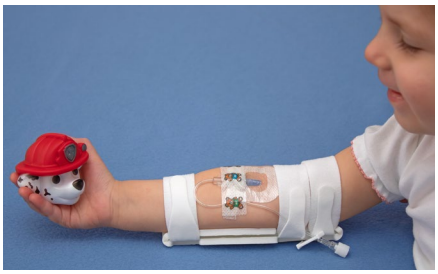
 *Endnotes available on pages 43–44

TLC® Elbow Splint

Touch / Look / Compare



Although not ideal, the antecubital (AC) space is often used in emergency situations or in patients with difficult intravenous access (DIVA). The ergonomically designed TLC Elbow Splint fits the natural shape of the arm and securely stabilizes the area of flexion when an AC is required.



Touch / Look / Compare

INS Standard 39, Practice Recommendation 2, calls for a joint stabilization device to be padded and support the area of flexion to maintain a functional position. Conventional armboards are flat and not optimized for the anatomical positioning requirements of the antecubital space. They obscure the posterior or dorsal aspect of the elbow joint, making it difficult for nurses to perform routine visual and manual assessments.

According to *miniMAGIC,* the locations into which IVs are placed directly impacts the success of the procedure and risk of complications. They further define appropriate locations for PIVCs: In difficult and urgent patient clinical situations, patients from neonates to adolescents, the AC is appropriate.

The concave surface of the TLC Elbow Splint mirrors the anatomy of the arm to help the patient maintain a neutral, stress-free posture. The TLC Elbow Splint prevents the patient from bending the arm to help minimize catheter occlusions, and movement of the catheter in the vein wall, which can contribute to infiltration, extravasation injuries, and even compartment syndrome during IV therapy.

The tapered design and soft foam padding of the TLC Elbow Splint help prevent friction between the TLC Splint and the patient's skin, reducing the likelihood of pressure injuries. Comfortable, adjustable straps at the proximal and distal ends secure the splint to the arm and provide clear and unobstructed visual access to the IV insertion site. A see-through opening allows nurses to Touch, Look, and Compare the arm with the opposite extremity to check for early signs of complications such as changes in color, temperature, and swelling.

The TLC Elbow Splint is available in five sizes and fits newborn, infant, pediatric, and adult patients. The 959XL-Ultra TLC Elbow Splint will fit most patients who require a small adult or standard adult size blood pressure cuff.

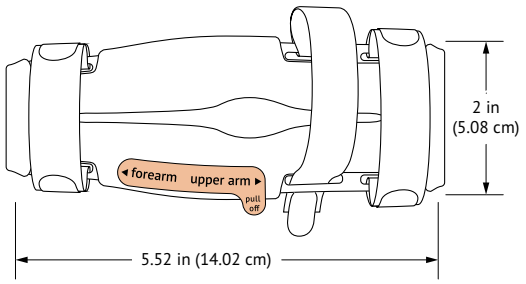
TLC Elbow Splint Features

- Easily assess the underside of the elbow and arm through opening.
- Cupped shape supports arm and elbow, and centers arm on splint.
- Ergonomic design eliminates irritation and tissue damage from rough edges found on traditional armboards.
- Soft straps are easy to apply and adjust to prevent restriction of circulation.
- Adjustable Velcro® tabs eliminate over-taping of fragile skin.
- Maximizes dwell time, minimizes the need for painful, traumatic restarts.
- Universal design fits either arm.
- Pediatric sizes also available without straps.
- Designed for use with any I.V. House site protection product.

I.V. House TLC® Elbow Splint > Product Specifications

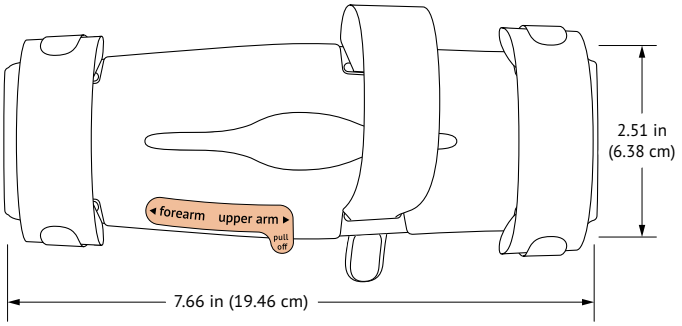
959XS-Ultra
Newborns 0–4 months, or 2.5–7 kg
Small splint, shorter straps

959S-Ultra
Infants 4–12 months, or 6–12 kg
Small splint, longer straps

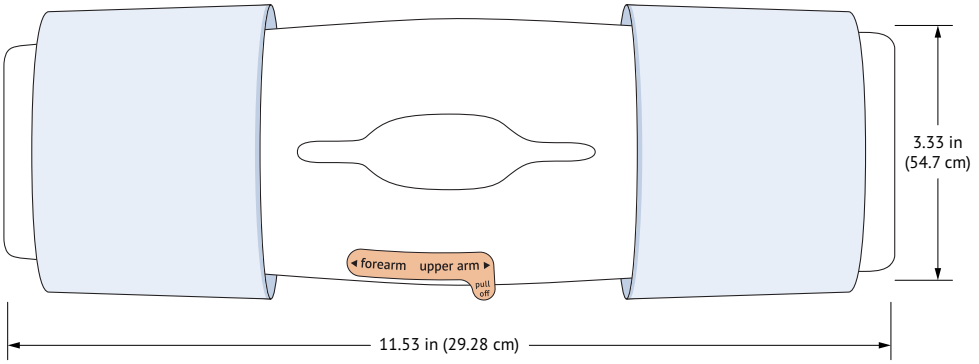


959M-W-Ultra
Toddlers 12–36 months, or 9–15 kg
Large splint, shorter straps

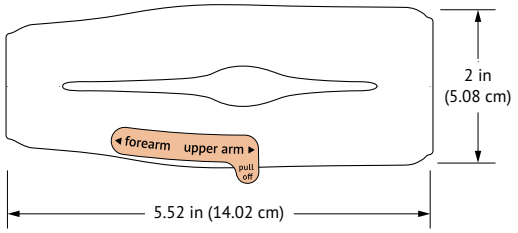
959L-W-Ultra
Children 3–10 years, or 12–41 kg
Large splint, longer straps



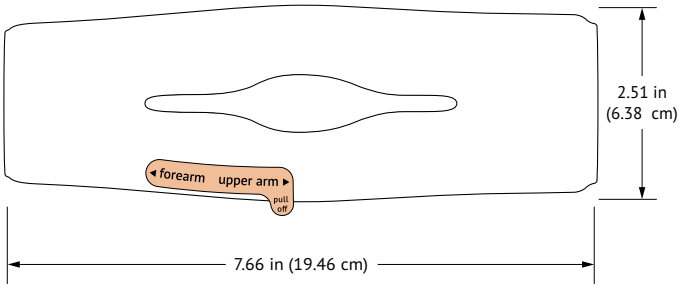
959XL-Ultra
Youth/Adults 10 years and up, or over 40kg
Fits arms 24-34 cm (9.4-13.4 in)
circumference at upper arm



959S-Basic
Infants 0–12 months, or 2.5–12 kg

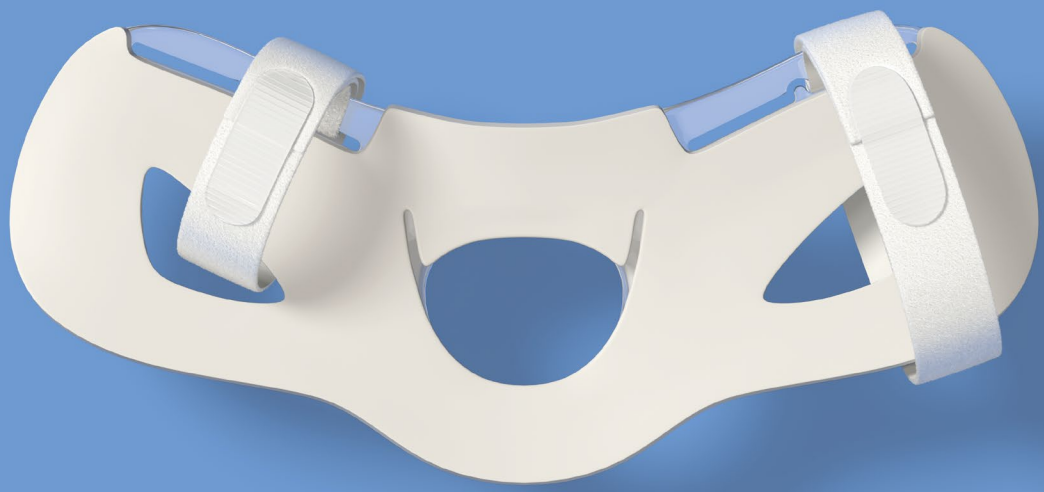


959M-Basic
Toddlers and children 12 months–10 years, or 9–41 kg



TLC® Foot Splint

Touch / Look / Compare



The TLC Foot Splint is designed to stabilize the foot and ankle of a newborn or non-ambulatory infant when an IV is in place. The see-through openings make it easy to Touch, Look, and Compare the underside of the leg, ankle, and foot with the opposite extremity to check for signs of complications.

Touch / Look / Compare

INS Standard 39, Practice Recommendation 2, calls for a joint stabilization device to be padded and support the area of flexion to maintain a functional position. Conventional armboards are not optimized for the anatomy of the foot or for the anatomical positioning requirements of pediatric IV therapies. Existing armboards often require that nurses twist the patient's ankle and foot to fit the shape of a flat, straight board, or break the board to make it into the shape of a boot, rendering it less stable and potentially exposing sharp edges.

The TLC Foot Splint is ergonomically designed to correspond with the natural shape of the patient's ankle, allowing the joint to remain in a neutral and stress-free posture. The splint is designed to fit either foot and can be applied either medially or laterally. The unique design provides comfortable support while maintaining access to the greater saphenous vein, the dorsal venous arch, and surrounding veins on the top of the foot. The lateral cupped shape of the splint mirrors the shape of the lower leg and helps to secure the splint's position on the extremity.

MiniMAGIC states the location into which an IV is placed directly impacts the success of the procedure and risk of complications. The study identifies the foot to be an appropriate site for non-ambulatory patients. Because the TLC Foot Splint does not require the clinician to bend the ankle or foot to fit a flat, straight board, the plantar surface of the foot remains visible, making it faster and easier to continuously monitor the IV insertion site for infiltration and extravasation injuries.

For active patients, the design of the TLC Foot Splint minimizes friction issues that cause skin abrasions or localized pressure ulcers. The soft foam padding provides added comfort and adjustable straps with Velcro® tabs secure the splint to the extremity.

TLC Foot Splint Features

Soft straps secure splint safely, with minimal tension.

Closed-cell foam pad provides a hygienic, comfortable surface.

Easily assess extremity through openings for care, maintenance, and hourly inspection.

Ergonomic shape supports ankle.

Softly rounded ends provide comfort for surrounding tissue.

Adjustable, resealable Velcro® tabs eliminate over-taping of fragile skin.

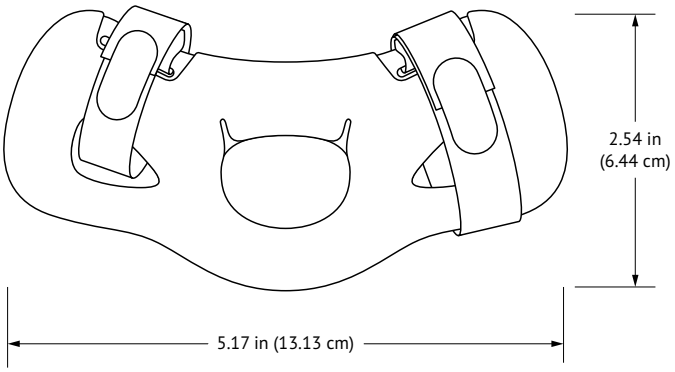
Maximizes dwell time, minimizes the need for painful, traumatic restarts.

Universal design fits either leg, medial or lateral side.

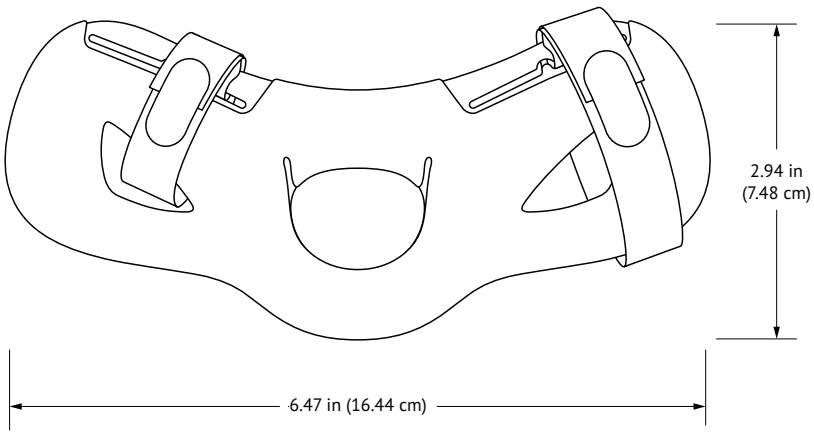
Adding an I.V. House UltraDome® or I.V. House UltraDressing® will help anchor the foot to the TLC Foot Splint and protect the IV site when infants kick their own feet.

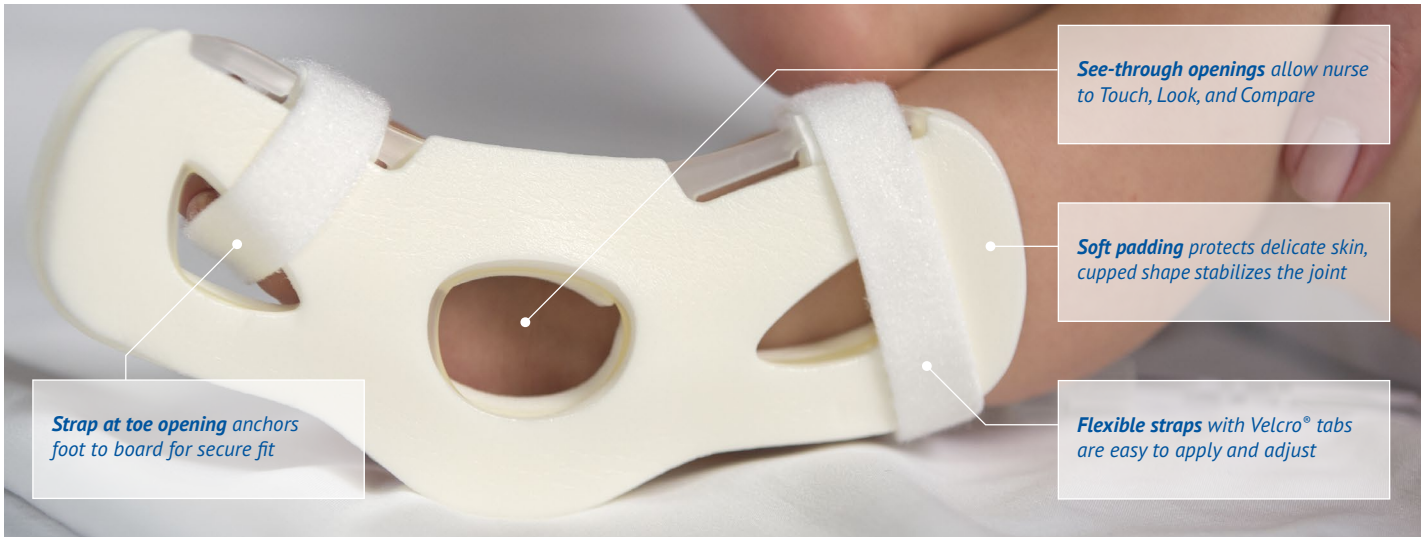
I.V. House TLC® Foot Splint > Product Specifications

949XS-Foot
Newborns 0–4 months, or 2.5–7 kg



949S-Foot
Infants 4–12 months, or 6–12 kg
May fit larger infants. Nonambulatory infants only.





 *Endnotes available on pages 43–44

Reducing Complications of Intravenous Therapy in Infants and Toddlers

Sabra Wilson, BSN, RN, VA-BC | St. Louis Children's Hospital, St. Louis, Missouri

Background

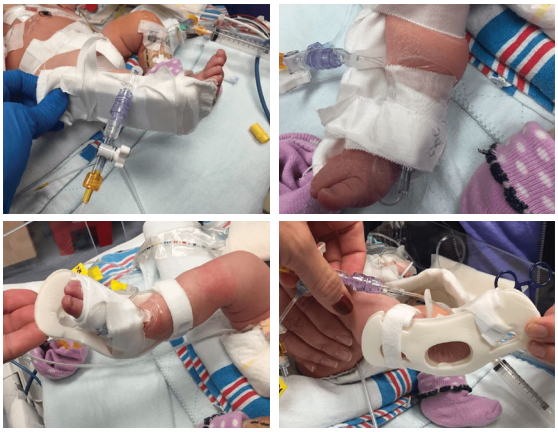
- Peripheral Intravenous (PIV) catheters are a common delivery method for medications during hospitalization but carry a high incidence of complications and frequently require re-insertion.
- There are several contributing factors that may increase the incidence of PIV complications in infants and toddlers:
  - Children are active making securement more difficult.
  - Infants and toddlers may be unable to verbalize discomfort due to age or disease process.
  - Integrity of their skin and blood vessels may be compromised.
- For infants and toddlers, when a PIV is placed at a site of flexion (hand, foot, antecubital), stabilization is essential to minimize catheter movement inside the vessel.
- The current arm board composed of cloth, foam and cardboard does not allow insertion site visualization when taped and secured in place.
- Palmar infiltrates occur when the infiltrate or extravasation goes undetected and gravity pulls fluid into the palm, potentially causing serious injury.
- Arm boards are routinely used to immobilize extremities and minimize catheter movement.
- Assessment of the PIV site with the current arm boards obscures the palmar site and becomes a time consuming process.
- Nurses must be able to assess the site by looking, touching, and comparing to ensure safe administration of intravenous fluids and medications.
- With a range of 15.7% to 33.8% and the mean incidence of 23.9%, infiltration is the most common form of IV catheter failure.

Supporting Evidence

- Recommendations from the Infusion Nursing Society state that all attempts should be made to avoid placing PIVs in areas of flexion, which is extremely difficult with infants and toddlers.
- Micro movement both inside and outside the vessel wall lead to infiltration of the intravenous fluid and frequent re-insertions.
- The Centers for Disease Control (CDC) recommends evaluation of the insertion site by palpation through the dressing to discern tenderness and by visual inspection.
- If a transparent dressing is used, removal of an opaque dressing for visual assessment is recommended if tenderness is present.

Previous Interventions

- The Vascular Access team adopted the Cincinnati Children's Hospital's Pediatric Intravenous Extravasation Assessment System and provided education for all nursing staff.
- The Vascular Access team worked with pharmacy to identify medications that are caustic agents or vesicant; medications were classified as Green, Yellow & Red.
- The acronym TLC (Touch, Look and Compare) was introduced to be used with all site assessments.



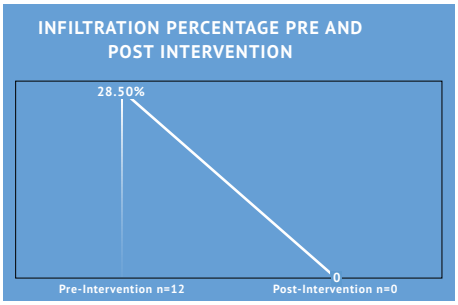
Proposed Intervention

- To address the ongoing concern, a pilot was conducted to test an ergonomically designed splint (TLC® Splint) that incorporated an opening that would allow nurses to palpate, visualize and compare the insertion site with the opposite extremity.
- It was postulated that the TLC Splint would allow 360° visualization to quickly identify palmar infiltrations and support improved assessment to promote patient safety.

Implementation and Results

- Data were collected on the infiltrate/extravasation rates and nurse satisfaction.
- Vascular access consults were used to establish the rates of infiltrate/extravasation from 11/23/15 – 12/31/16.
- The splint clearly demonstrated support for adoption of the new product.

Evaluation Criteria	Yes	No	N/A	Not Scored
1. Instructions clear and easy to use	68.8%	0	22%	8%
2. Splint easy to apply and remove	62.2%	0	20%	17.7%
3. Splint remained secure	77.7%	2%	4%	15.5%
4. Effectively immobilized extremity	93.3%	2%	0	4%
5. Provides easy visualization	95.5%	0	0	4%
6. Facilitated hourly assessment	88.8%	2%	2%	4%
7. Safety improved: No skin breakdown	88.8%	2%	0	8%



*Endnotes available on pages 43–44

Innovative IV Insertion Site Protection—Secondary Securement

The use of I.V. House products for secondary securement extends the dwell time of a PIV by cutting the risk of all types of failure in half. Secondary securement reduces the risk of common complications such as occlusion, infiltration, phlebitis, and accidental dislodgment.[98]

Best Practice Recommendations for the Prevention of Injury

PIVs are the most commonly used medical device with up to 70% of patients requiring one or more during their hospital stay.[99] I.V. House's dome design provides secondary securement and allows nurses to implement best-practice recommendations including visibility of the IV insertion site, hourly assessment, and documentation of patency. Although more rigorous research is needed[100,101] on a bundled approach that includes primary and secondary dressings, there are findings that indicate these types of bundles are associated with fewer complications.

Extends Dwell Times

I.V. House devices reduce complications such as dislodgment, phlebitis, infiltration, and extravasation and can greatly decrease negative outcomes and the need for costly and traumatic reinsertions[102,103] that occur in 35% to 69% of peripheral IV catheters. Protecting a successful IV insertion can be especially reassuring to needle-phobic patients and small children.

The I.V. House UltraDome and I.V. House UltraDressing are designed to be safe and gentle, while preventing patients of all ages from accidentally dislodging or removing their IV catheters while they are hospitalized.

Eliminates Exposed Tubing, a Primary Cause of Dislodgment

The protection provided by the I.V. House UltraDome and I.V. House UltraDressing makes painful snagging on clothing, bedding, or furniture a thing of the past. Securement bundles, including those utilizing the TLC Splint and the I.V. House UltraDome or I.V. House UltraDressing, have been associated with improved dwell time and reduced IV therapy complications.[104] Research suggests that nurses are already using supplementary securement methods, which indicates that current dressings alone do not meet their needs.

Vented Transparent Dome Allows Easy Care and Maintenance

Over-taping, gauze or cohesive wraps, No-No® pediatric arm restraints, Pedi-Wraps, and Snuggle Wraps are not compliant with *INS Standards of Practice*, and should be eliminated from nursing practice for the safety of patients, as they can obscure the IV insertion site and surrounding area, causing nurses to miss crucial early signs of trouble. The transparent plastic domes on I.V. House products provide immediate, uninterrupted access to the IV insertion site in compliance with ***INS 2021 Standards of Practice*** **38.1** "*VADs are secured to prevent complications associated with VAD motion at the insertion site and unintentional loss of access.*" **38.2** "*Methods used to secure the VAD do not interfere with the ability to routinely assess and monitor the access site or impede vascular circulation or delivery of the prescribed therapy.*" **40.1** "*Site protection and/or physical immobilization devices (e.g. clear VAD covers and mitts) are used to protect VADs or VAD sites, thus maintaining infusion therapy and device functionality.*"

INS Standards are declarative statements, an expectation of the profession by which the quality of practice, service, or education is judged. They describe the action needed to provide competent care.

 *Endnotes available on pages 43–44

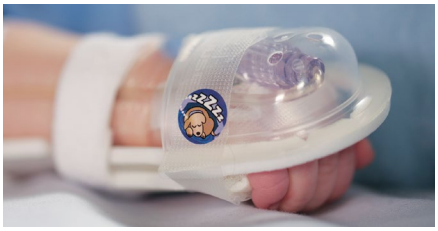
I.V. House UltraDome®

Shield / Secure / Stabilize

727SFP (Small Dome)

750LFP (Large Dome)

The innovative I.V. House UltraDome is a clear, ventilated, plastic IV insertion site protector that serves as a secondary securement device. It is designed to shield, secure, and stabilize the catheter hub and loop of tubing to protect against dislodgment.

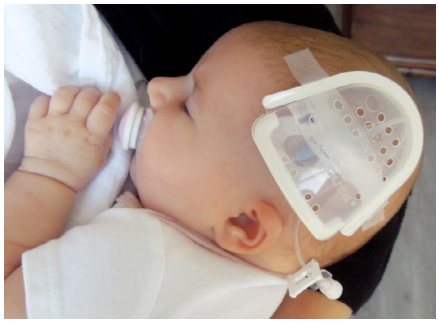


Innovative Design

The Infusion Nurses Society recommends assessment of peripheral IV insertion sites to check for tenderness, swelling, drainage, and/or paresthesia, numbness, or tingling at a specific frequency depending on the age of the patient. **The INS Standard 40 recommends that neonatal and pediatric IV insertion sites be assessed every hour.**

The I.V. House UltraDome makes it easier to visualize[105,106] the IV insertion site, allowing for frequent checks without disturbing the patient. Most secondary securement devices obscure the IV insertion site. Opaque materials such as gauze, bandages, or other dressings make it difficult to spot signs of infiltration, extravasation, or phlebitis.

The I.V. House UltraDome minimizes tape usage while maximizing protection of the IV insertion site and the patient's skin.



I.V. House recommends a tape-on-tape procedure to reduce over-taping at the IV insertion site. A 2019 study found that nurses commonly use secondary securement "which suggests an element of inherent mistrust of primary dressings."[107]

The use of secondary securement has been associated with extending the dwell times of a PIV by reducing the risk of common complications such as infiltration, phlebitis, and dislodgment. Continuous movement by pediatric patients can cause irritation to the vein. The use of an I.V. House UltraDome, in conjunction with a TLC Splint, effectively stabilizes a PIV site. Visual aids, such as a poster outlining signs of common complications, can be helpful reminders to staff, parents, and patients about PIV loss prevention.[108]

I.V. House UltraDome Features

Minimizes tape usage to reduce injuries including epidermal stripping, skin irritation, and dislodgment.

Soft foam-padded edge is gentle on the skin; outer rim is padded for additional comfort.

Easy visibility for care and maintenance of IV insertion site to prevent injuries such as infiltration and extravasation.

Eliminates exposed loop of tubing, a primary cause of dislodgment.

Maximizes dwell time, minimizes the need for painful, traumatic restarts.

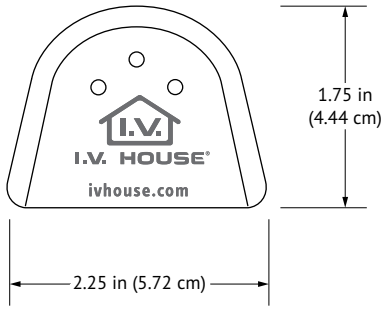
Universal design fits the hand, forearm, antecubital space, foot, ankle, scalp, or other peripheral IV insertion site.

Designed for use with the I.V. House TLC® Splint.

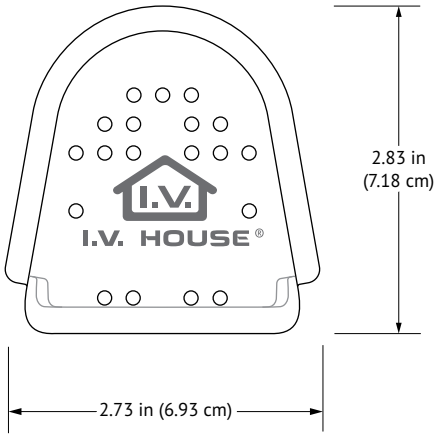
*Endnotes available on pages 43–44

I.V. House UltraDome® > Product Specifications

727SFP
Small Foam Padded Dome IV Site Protector
Neonates, infants, toddlers, and children



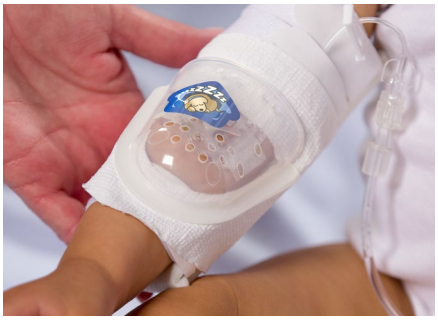
750LFP
Large Foam Padded Dome IV Site Protector
Plus Open Edge Padding
Infants, toddlers, children, and youth



I.V. House UltraDressing®

Tape-Free Protection and Access

The I.V. House UltraDressing is a secondary stabilization device that delivers innovative, tape-free protection of the IV insertion site. The ventilated, transparent dome secures the catheter hub and loop of tubing. The fabric wrap is gentle on the skin and comfortable for patients; foam on the open edge provides additional protection.



Design Fits Either Hand or Arm

The I.V. House UltraDressing was designed by the world leader in hand ergonomics and industrial design. It fits like a glove to provide over-the-top secondary securement and protection. By eliminating the need for tape, there is less skin irritation or likelihood of medical adhesive-related skin injuries and catheter-related skin injuries.

Intravenous catheters are cited as the most common indwelling device.[109] Common complications include phlebitis, infiltration/extravasation, occlusion, leakage, pain, and dislodgment.[110] Strategies

to prevent Hospital Acquired Conditions, PIVIEs, related to these devices are necessary. The secondary securement provided by the I.V. House UltraDressing reduces bumps and snags that can contribute to IV therapy complications and increase dwell times.

The I.V. House UltraDressing 730 Series comes in three sizes for the hand: 730S, 730M, and 730L. The 730Arm protects IV insertion sites on hand, forearm, antecubital space or upper arm.

The Velcro® tab allows for easy, anytime assessment of the IV insertion site. This is especially important in critically ill and pediatric patients, where IV insertion sites are inspected hourly.

I.V. House UltraDressing Features

Adjustable, re-attachable Velcro® tab eliminates over-taping of fragile skin.

Smooth edges and soft, pliable fabric wrap provide safe, gentle IV protection.

Improves visibility and monitoring of IV insertion site to prevent injuries such as infiltration and extravasation.

Eliminates exposed loop of tubing, a primary cause of dislodgment.

Maximizes dwell time, minimizes the need for painful, traumatic restarts.

Universal design fits either hand or arm. Designed for use with the TLC® Splint.

AWARD-WINNING DESIGN

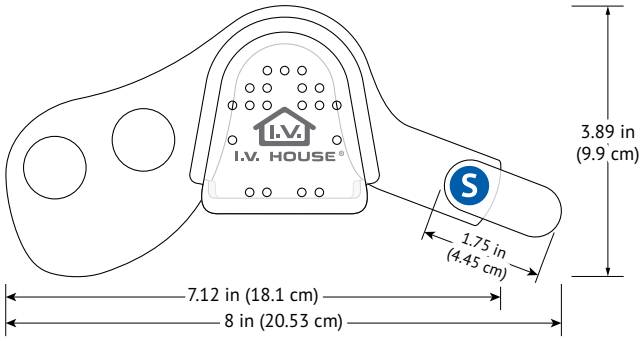
The **I.V. House UltraDressing** has won three awards including a prestigious Medical and Scientific Equipment Gold IDEA winner (Industrial Design Excellence Award), presented by the Industrial Designers Society of America and sponsored by *Business Week Magazine*.

*Endnotes available on pages 43–44

730 Series I.V. House UltraDressing® > Product Specifications

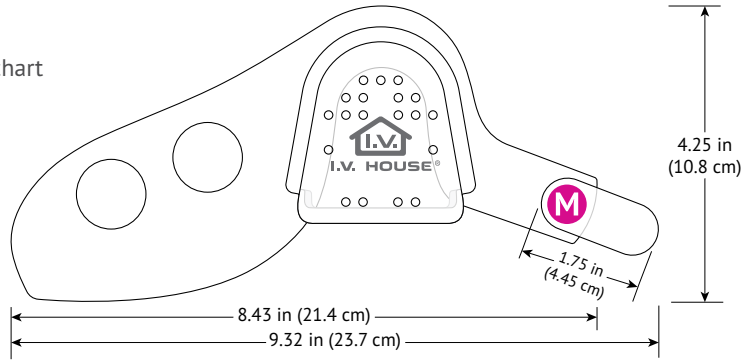
730S

Small Hand — refer to sizing chart



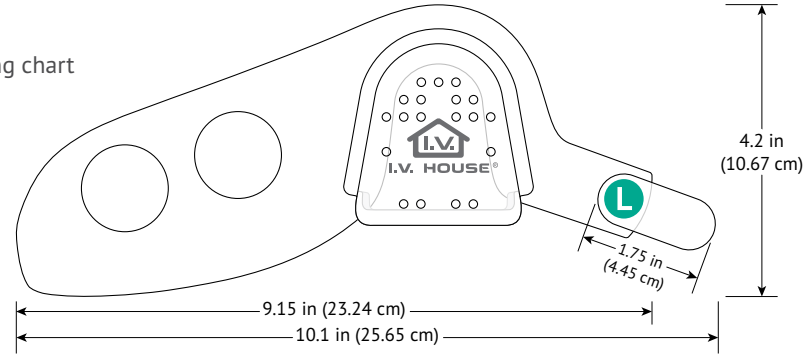
730M

Medium Hand — refer to sizing chart



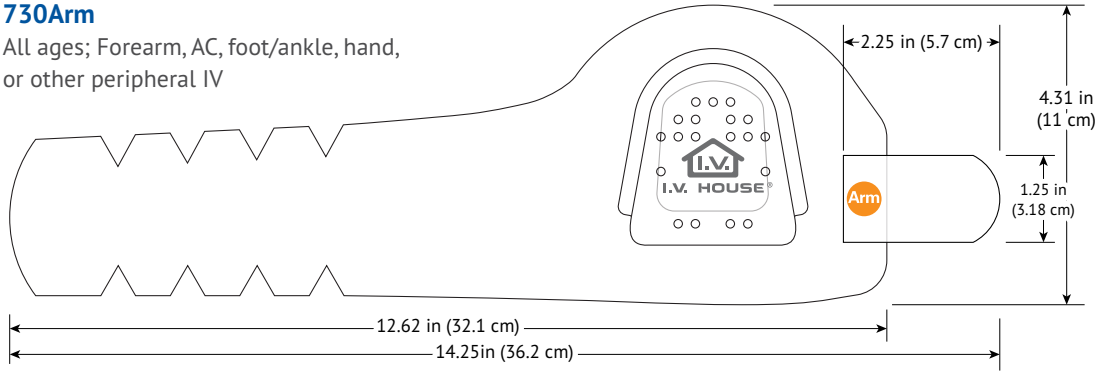
730L

Large Hand — refer to sizing chart



730Arm

All ages; Forearm, AC, foot/ankle, hand, or other peripheral IV



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*Endnotes available on pages 43–44

330 Series I.V. House UltraDressing®

Protection for Infants, Toddlers, and Children

330M I.V. House UltraDressing

330L I.V. House UltraDressing

Because infants are unable to communicate their level of discomfort, it's imperative that health care providers can quickly and easily access the IV insertion site for visual and manual assessments. The transparent plastic ventilated dome of the 330 Series I.V. House UltraDressing is paired with a comfortable fabric wrap to provide protection for the IV insertion sites of pediatric patients ranging from very low birth weight neonates to children.

Innovative Design

The 330 Series I.V. House UltraDressing is a secondary securement device. It covers the IV insertion site to prevent movement of the catheter to reduce complications, including dislodgment that can lead to serious delay of treatment.

According to the Infusion Nurses Society, when an infusion is running (continuous or intermittent), peripheral IV insertion sites should be routinely assessed for redness, tenderness, swelling, drainage, and/or paresthesia, numbness, or tingling every hour for neonatal and pediatric patients. Infrequent assessment is the number one cause of pediatric IV loss. The I.V. House UltraDressing 330 Series provides nurses with easy access to the IV insertion site allowing for more frequent checks without disturbing the patient.

The adjustable strap with Velcro® closure reduces the need for tape, which can damage fragile skin of the smallest patients. When used together with the TLC Splint, the soft fabric wrap of the I.V. House UltraDressing holds the extremity securely against the splint to help reduce friction and potential pressure injuries.

Current dressings and securement options alone do not meet the needs of clinicians and patients. "The I.V. House UltraDressing is a useful device that can be used to increase catheter dwell time and protect and stabilize PIVCs in pediatric patients. This provides additional evidence-based support for the prolonged use of the I.V. House UltraDressing as a safe, easy-to-use, and effective device to protect or manage PIVCs in pediatric patients."[4]

330 I.V. House UltraDressing Features

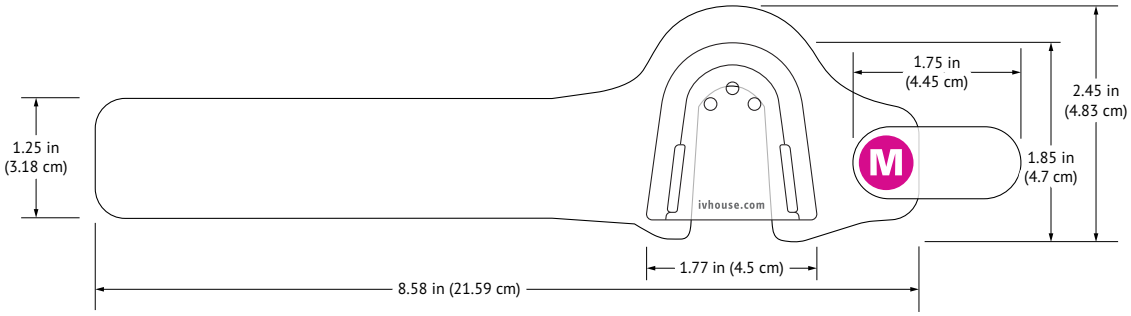
- Adjustable, resealable Velcro® tab eliminates over-taping of fragile skin.
- Smooth edges and a soft, flexible fabric wrap for safe, gentle IV protection.
- Provides easy visibility for frequent assessment of the IV insertion site for early detection and prevention of injuries such as infiltration and extravasation.
- Eliminates exposed loop of tubing, a primary cause of dislodgment.
- Maximizes dwell time, minimizes the need for painful, traumatic restarts.
- Available in two sizes; fits either hand, arm, foot or leg.

*Endnotes available on pages 43–44

330 Series I.V. House UltraDressing® > Product Specifications

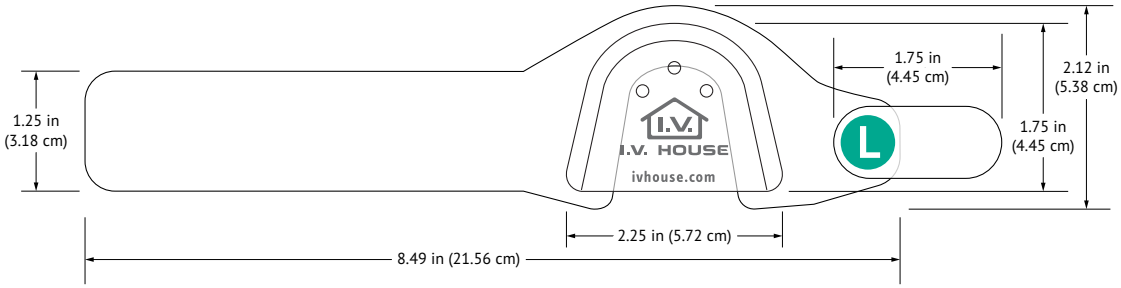
330M

Smaller Dome Size IV Site Protector
Neonates, infants, toddlers, and children



330L

Small Dome Size IV Site Protector
Infants, toddlers, and children



IV Insertion Site Protection Study

Cook Children's Medical Center, Fort Worth, Texas

After noticing an increase in the number of harmful infiltrations, Cook Children's Medical Center embarked on an evidence-based practice project to improve peripheral intravenous catheter securement and visualization.

Nurses would report that an IV insertion site looked good, but also indicate on a form that the site had not been visualized during routine assessments. They expressed frustration at not being able to see an IV because tape used to secure the IV catheter obstructed their view.

The goal of the evidence-based study was to maintain easy visualization of the IV insertion site, minimize infiltrations, increase dwell times, and find an easy-to-use solution that would also be more cost-effective for the hospital. After reviewing best practices and recommendations from more than 30 research and non-research articles, the hospital created IV start kits that included a clear dressing, a catheter stabilization device, clear tape, and the I.V. House UltraDome®.

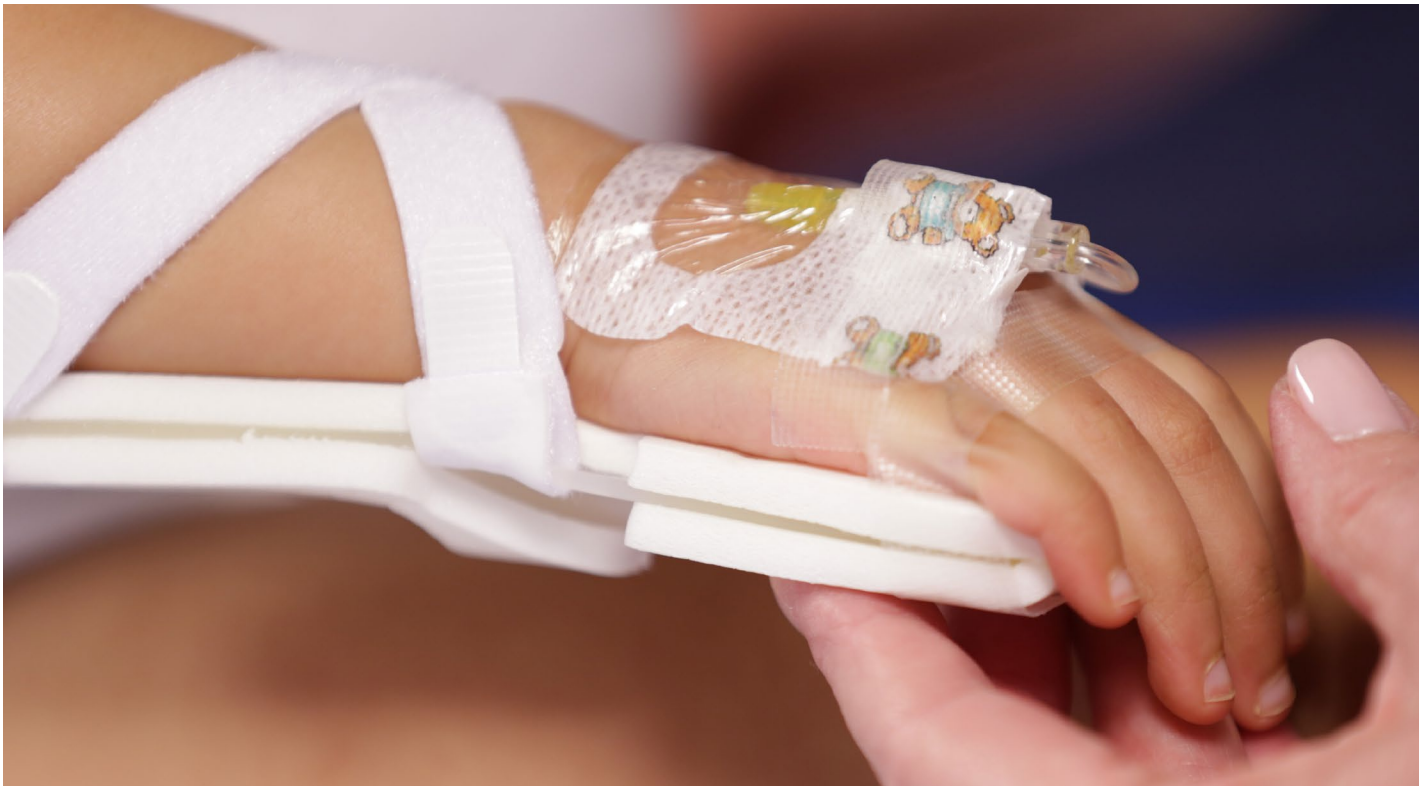
Nurses reported the kits were easy to use and increased visibility of the IV insertion site to improve visual access for better hourly assessments.

Outcomes: Baseline to 12 months

Outcomes	Baseline 2008	12 months post study
Site Clearly or Easily Visible	58.4%	94%
Site Obscured	40.4%	5%
Use of Clear Dressing	40%	92%
Use of IV House UltraDome	11.7%	81%
Use of Securement Device	0%	76%
Duration of PIV	38.2 hours	62 hours

During the pilot study, infiltrations dropped by approximately 30%. In addition to a reduction in painful Hospital Acquired Conditions, Cook Children's will see cost savings in equipment and nurse time due to increased dwell times.

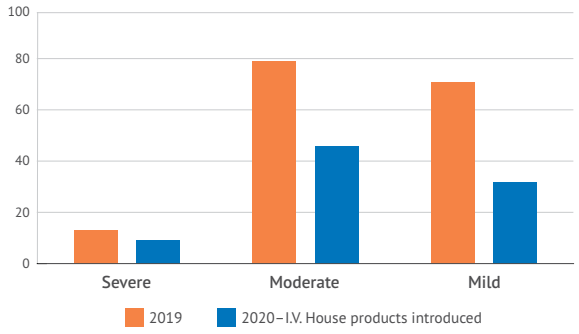
Study results originally shared at the: 2011 Society of Pediatric Nursing 41st Biennial Convention, October 29–November 2, 2011.



Combined interventions help reduce patient harm. A large children's hospital in the Northeast saw a dramatic reduction in mild, moderate, and severe infiltrates in the first year of introducing the TLC Splint and I.V. House UltraDome® into their IV therapy practice. The hospital determined the decrease in peripheral IV infiltration and extravasation (PIVIE) events supports the continued use of the products.

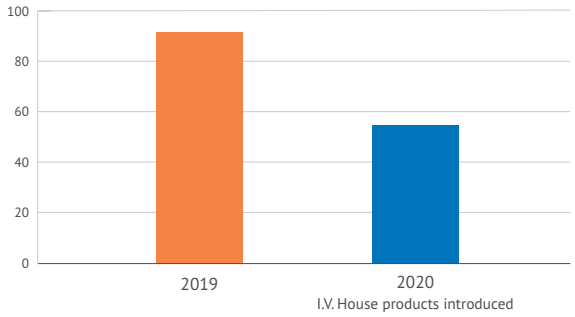
Reduction in Infiltrates at a Major Pediatric Hospital

Reduction in All Infiltrates



In the first year after adopting I.V. House products, one hospital saw a 30% reduction in severe infiltrates, 42% reduction in moderate infiltrates, and 55% reduction in mild infiltrates.

Reduction in Moderate to Severe Infiltrates



Using the TLC Splint and I.V. House UltraDome, this hospital was able to reduce patient harm with a 40% decrease in moderate to severe infiltrates from 2019 to 2020.

 *Endnotes available on pages 43–44

Aging Population and IV Care

The aging population presents unique challenges for the health care industry as we discover how to best provide treatment and care.

Difficult intravenous access is common in adult and senior patients, with up to 26% first attempt failure rates. Furthermore, adult patients experience peripheral IV failure rates as high as 76%. Finally, adults and seniors have a significantly higher number of PIVs placed per week of hospitalization compared to pediatric patients.[111]

Special considerations must be made when placing an IV in fragile skin. Geriatric adults are more susceptible to pain, bruising, and swelling and have a higher risk for potential catheter-associated skin injuries. The *INS Infusion Therapy Standards of Practice* recommends nurses employ quality improvement measures to monitor and address catheter-associated skin injuries. These measures include educating nurses on proper dressing selection, atraumatic application and removal, and site care for patients at increased risk of complications.

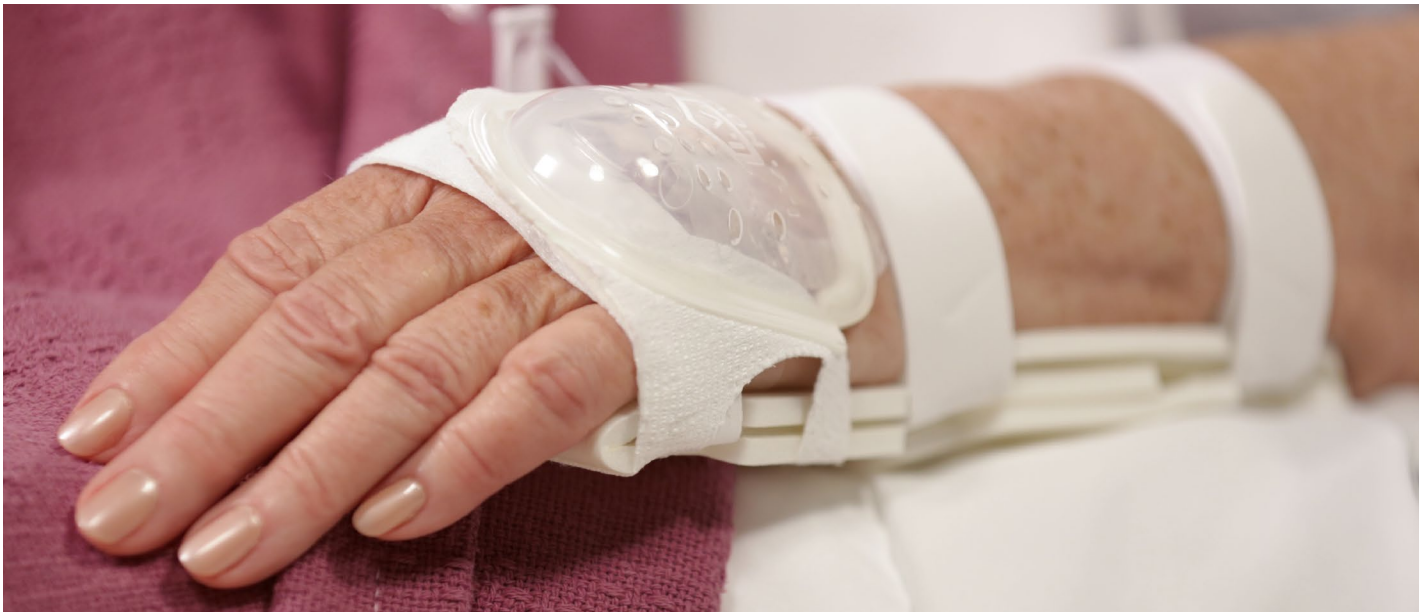
In a recent study, more than half of adults described IV insertion as painful. In addition, older adults with weakened immune systems are at higher risk for infection.[112] Consider IV site selection in locations with minimal movement to promote patient comfort and allow patients to perform daily activities and sleep. Knowing up to 69% of IV catheters fail, properly securing and protecting the IV insertion site is critical in reducing the risk of injuries that could prove life-threatening.

According to the INS, considerations for older adult patients include anatomical changes such as loss of thickness of the dermal skin layer, thickening of the tunica intima/media, and loss of connective tissue, which can contribute to vein fragility and present challenges in vascular access. The *INS Infusion Therapy Standards of Practice* makes it clear, it's imperative to identify patients at risk and take precautions with PIV site care.

Care and Maintenance

The Infusion Nurses Society recommends the IV insertion sites of critically ill patients, those who are sedated or have cognitive deficits (such as dementia or Alzheimer's Disease) be checked at least every one to two hours for any sign of complications. The I.V. House line of IV site protection and securement products make it easy and less disruptive to assess patients for signs of infiltration or extravasation.

 *Endnotes available on pages 43–44



The I.V. House, Inc. Line of Products Offers Protection to Older Patients

I.V. House TLC® Splint	I.V. House UltraDressing®
Stabilizes area of flexion	Covers IV insertion site and features soft wrap with Velcro® tabs to secure to extremity without tape-to-skin contact
Soft foam padding and soft foam straps prevent skin irritation	Soft foam padding on edges
IV insertion site is visible; see-through openings allow for 360-degree view of extremity for easy assessment without removal of product	IV insertion site is visible and UltraDressing is easy to remove for assessment
Reduces risk of dislodgment	Reduces risk of dislodgment
Increases dwell time	Increases dwell time

The Goals of Securement and Protection Are:

- Increasing visibility of the IV insertion site
- Allowing for optimal mobility
- Limiting use of tape
- Reducing risk of dislodgment
- Protecting the IV insertion site
- Increasing dwell time length
- Reducing patient interference

Benefits of Ergonomic Design

The I.V. House Design Process

While at a conference, a nurse who was concerned about patients at her hospital developing palmar infiltrates approached I.V. House founder, Lisa Vallino, with an idea to solve this problem. She wanted to know if it was possible to manufacture an armboard that allowed the nurse to visualize the IV insertion site and surrounding tissues.

Vallino and her team collaborated with Metaphase, an industrial design firm recognized as the world leader specializing in the ergonomics, research, and design of products that interact with the human hand.[113] Together, they developed the TLC® Splint that allows clinicians to Touch, Look, and Compare the IV insertion site with the opposite extremity.

The first step in I.V. House product development is creating rough prototypes based on the stated criteria. In the case of the TLC Splint, it was critical that it secure the joint near the IV insertion site, and allow a nurse to palpate and visualize the entire extremity to inspect for skin breakdown or palmar infiltration.

The design team understood the product needed to be functional, visually neutral, and physically comfortable.

After the first round of prototypes, I.V. House consulted with a group of nurses for input to guide the design. At the final design stage, I.V. House again let nurses try the device to ensure that all the criteria were met.

I.V. House and Metaphase hosted two design meetings with nurses where input was given on early designs, so Metaphase could incorporate that feedback into subsequent models. When the TLC Splints were released they were very different from the original design, and they continue to evolve based on nurse feedback.

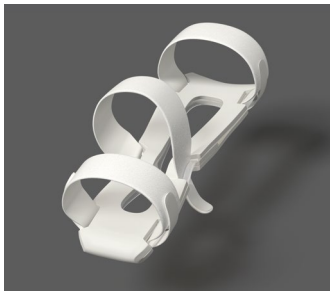
Recent improvements inspired by nurse input include increased padding, thicker foam, longer/wider straps, and an orientation label to help nurses position the TLC Splint more easily. In addition, I.V. House created lanyard badge buddies to help nurses choose the correct product size based on a patient's weight.

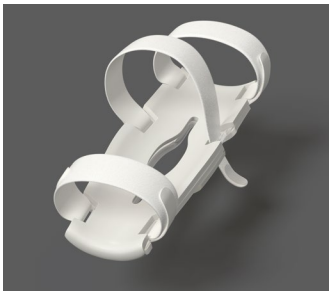
The design and development of the TLC Wrist Splint took more than three years. The final product is available in four sizes to accommodate the patients in the 5th to 95th percentile size range—from children through adults. It can be worn on either the left or right wrist and is available with or without straps. Subsequent TLC Splint products with similar features are available for the foot and elbow.

The I.V. House UltraDome® and I.V. House UltraDressing® went through a similar design and development process; many of the ergonomic and design cues from these earlier products were ultimately incorporated into the TLC Splint.

The Importance of Human Factors and Ergonomics

When designing products for the health care field, it's important to solve problems for the nurse, patient, and family caregiver. For I.V. House, that translates to creating products that make it faster and easier for nurses to check for signs of complications that can lead to serious patient harm, while protecting and stabilizing the IV insertion site. In addition, the fit of the product should make the patient feel comfortable and confident while participating in activities of daily living. Devices that extend dwell times until clinically indicated for removal[114] and reduce the need for painful restarts will help improve patient outcomes and increase patient satisfaction scores.[115]





"The mission of I.V. House is centered around nurses, patients, and their peripheral IV insertion sites. Whether the patient is an infant, child or older adult, I.V. House products improve IV site securement and protection. In fact, it's hard to imagine any patient who wouldn't benefit from an I.V. House product."

–Lisa Vallino, CEO, I.V. House, Inc.

*Endnotes available on pages 43–44

About I.V. House, Inc.

Founded in 1991, I.V. House® brings innovative secondary securement products that stabilize, secure, and protect IV insertion sites to hospitals worldwide. I.V. House products combine Human Factors and Ergonomics with thoughtful input from nurses to deliver real-world solutions that improve patient safety and increase nurse efficiency, and reduce hospital costs.

Committed to Innovation

By partnering with the world leader in industrial design, specifically in ergonomics for hand-intensive products, I.V. House has developed a product portfolio that incorporates best practices of human factors to improve end-user workflow and ergonomics to maximize product performance and increase patient safety and comfort. By developing products that protect the IV insertion site while simultaneously increasing visibility, hourly site checks are easier to perform, reducing the risk of injury.

Committed to Product Quality

I.V. House, Inc. is an ISO 9001:2015 registered company in respect to the Design and Manufacture of Medical Devices. I.V. House products are made in the USA with raw materials sourced from U.S. companies. All products are created to adhere to the best practices in manufacturing and nursing standards. I.V. House products are environmentally friendly and manufactured with quality fabrics and materials.

Committed to Nurse Success

Because nurses have multiple tasks that need to be completed simultaneously, I.V. House products are easy to use and allow health care providers to visually monitor the IV insertion site more efficiently. Although I.V. House products are designed to be intuitive in their use, written instructions, product demonstration videos, tips and tricks sheets, product posters, and other in-service materials can be downloaded at www.ivhouse.com. On-site educational training, lanyard badge buddies with product sizing information, and email and phone support are available to our customers. Orientation labels have been added to the TLC Splints to assist nurses with the proper application. A finger tape note and a toe strap note have also been added to the baggie to remind nurses about these important application details.

Committed to Patient Care

Patient safety and satisfaction are at the core of I.V. House product development. Whether on the hand, wrist, arm, elbow (antecubital space), scalp, or foot, I.V. House products shield, secure, and stabilize the IV insertion site. This reduces the risk of early catheter failure and increases dwell time, thereby reducing the need for painful and time-consuming IV restarts. I.V. House products are available for purchase to distributors and hospitals.

Committed to Delivering Value

I.V. House provides value to hospitals worldwide by delivering quality products that reduce overall costs. The average cost of a short peripheral IV catheter insertion in the United States is between $28 and $35 for straightforward "first stick" insertions. Unfortunately, the failure of one peripheral IV catheter initiates a negative and costly cycle of catheter removal and reinsertion with each restart costing $69 on average. A recent report indicates the cost of accidental dislodgment could be more than $266 million annually.[2] Significant savings in equipment and staff time could be realized by hospitals if a small number of dislodgments could be reduced through effective securement. By increasing dwell time and reducing serious harm from IV-related injuries, patient satisfaction increases, and litigation costs go down.

60%

of the 2020–21 U.S. News and World Report Best Children's Hospitals list of 10 Honor Roll Hospitals are I.V. House customers.[116]

65%

of the hospitals on the U.S. News' 2020–21 Honor Roll, which had the highest rankings across all specialties, use I.V. House products.

I.V. House products are used in hospitals worldwide including the U.S., Australia, Canada, Italy, Kuwait, the Philippines, Qatar, Republic of Korea, Saudi Arabia, Switzerland, and the UK and Ireland.

8.2M

8.2 million units sold to date.

SOCIETY OF PEDIATRIC NURSES®

2024 CORPORATE PARTNER

*Endnotes available on pages 43–44

I.V. House, Inc. Manufacturing

I.V. House is the world leader in the design and development of innovative products that stabilize, secure, and protect IV insertion sites. Hospitals worldwide use these devices to prevent patient harm and reduce costs associated with those injuries. I.V. House products combine Human Factors and Ergonomics with thoughtful input from nurses to deliver real-world solutions that improve patient safety and increase nurse efficiency.

In order to deliver superior IV insertion site protection and joint stabilization devices, I.V. House selects the highest quality raw materials from U.S. companies and partners with socially and environmentally responsible manufacturers.

All I.V. House Products Feature:

Class 1 Medical Device

All I.V. House products are classified by the FDA as Class I, 510(k) No:K912942 Exempt Medical Devices. Owner/Operator No:9044986.

Diverse Supplier

I.V. House is a certified Woman Business Enterprise (WBE) through the State of Missouri, Office of Administration. I.V. House also qualifies as a small business as defined by the U.S. Small Business Administration under category 339112, Surgical and Medical Instrument Manufacturers. The TLC® Splint UNSPSC # is 42221802. Desc: Intravenous or arterial arm board. The I.V. House UltraDome and I.V. House UltraDressing UNSPSC # is 42221803. Desc: Intravenous or arterial catheter positioning tapes or dressings or straps or cuffs.

Environmentally Friendly

I.V. House is committed to developing products with eco-friendly materials. All products are Latex-free and 100% free of DEHP and BPA, two industrial chemicals that have been shown to harm human and environmental health. I.V. House strives to use suppliers that share this environmental commitment. The manufacturer of the plastic used in the I.V. House UltraDressing®, I.V. House UltraDome®, and TLC® Splint recycles and reuses all of its scrap in the production process.

Complies with CDC Guidelines

The 2011 CDC guidelines state that hospitals should "Leave peripheral venous catheters in place in children until IV therapy is complete, unless complications occur."[117]

Complies with OSHA Standards

OSHA's bloodborne pathogens standard (29 DFR 1910.1030) requires that employers of workers with occupational exposure to blood or other potentially infectious materials annually consider and implement appropriate, available, and effective safer medical devices designed to eliminate or minimize that exposure [See 29 CFR 1910.1030 (c)(1)(iv)(B)].

Expiration

I.V. House's products do not require a listing of expiry date or shelf-life information. The products are Class I, non-sterile medical devices, and as such are exempt from Food, Drug, and Cosmetic Act Section 510(k) pursuant to 21 C.F.R. 862-892.

Social Responsibility

I.V. House products are assembled and packaged at facilities that employ adults with disabilities. Through extensive training and support programs, the employees learn to overcome challenges and to utilize their talents in a productive, professional environment.

ISO Certification

I.V. House, Inc. is an ISO 13485:2016 registered company in respect to the Manufacture and Distribution of Peripheral IV Site Protection and Joint Stabilization Devices. Certificate number C2023-04201

I.V. House Quality Policy

I.V. House has determined that to succeed and grow, only the highest standards of quality in both product and service will suffice. We aim to not only meet but to exceed our customer's expectations and continuously improve.

CE

CE Marking

I.V. House has received CE Mark approval for the TLC Splint for the wrist, elbow, and foot, and for the I.V. House UltraDome and I.V. House UltraDressing.

Where to Order

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I.V. House products are registered with the following regulatory bodies:

Australia: Australian Government Department of Health, Therapeutic Goods Administration

Italy: Ministry of Health (Ministero della Salute)

Philippines: Department of Health, Food and Drug Administration, Center for Device Regulation, Radiation Health and Research

Republic of Korea: Ministry of Food and Drug Safety

Saudi Arabia: Saudi Food & Drug Authority, Medial Devices National Registry

 *Endnotes available on pages 43–44

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Standard 2: Special Patient Population: Neonatal, Pediatric, Pregnant, and Older Adults, page S13–S14

Standard	How do I.V. House products meet these recommendations?
2.1 The needs and characteristics of special patient populations, including physiologic, developmental, communication/cognitive ability, and/or safety requirements, are identified and addressed in the planning, insertion, removal, care and management, and monitoring of vascular access devices (VADs) and with administration of infusion therapy. **Practice Recommendations** A. Considerations for neonatal and pediatric patients: … 3. Provide vascular access with attention to the child's anatomical, physiological, and developmental level. a. Identify pediatric patients with difficult intravenous access (DIVA); utilize technology (e.g., ultrasound, near infrared light) and ensure skill of clinicians to improve insertion success … … 5. Identify and interact with appropriate patient caregivers (e.g., Parents, other family members, surrogates) as members of the patient's health care team, including provisions of patient education, with attention to age, development level, health literacy, culture, and language preferences. … C. Considerations for the older adult patients: 1. […] Anatomical changes, including loss of thickness of the dermal skin layer, thickening of the tunica intima/media, and loss of connective tissue, contribute to vein fragility and present challenges in vascular access.	See-through openings on the TLC Splint, and the clear, ventilated plastic domes on the I.V. House UltraDome and I.V. House UltraDressing improve access to the IV catheter and surrounding tissue for easier care, maintenance, and assessments. Frequent site assessments are necessary with DIVA patients to ensure the patency of the IV. I.V. House joint stabilization and IV insertion site protection products make it easy to both visually and manually assess the IV insertion site. Pediatric IV initiation is challenging for many reasons, i.e., adiposity, age, prematurity. Using a DIVA Scoring tool has been shown to increase the first stick attempt. (*Difficult Peripheral Venous Access in Children: An International Survey and Critical Appraisal of Assessment Tools and Escalation Pathways* – 2019) I.V. House recommends nurses educate patients and their caregivers about how to identify early warning signs of IV therapy complications using the Touch, Look, and Compare method. Signs of complications include changes in color, temperature, or swelling and comparison of opposite extremity for similar size and proportions. The I.V. House UltraDressing® and TLC Splints reduce the need to use excessive tape to protect the IV insertion site, protect the fragile skin of older adult patients, and help prevent Catheter-Associated Skin Injury (CASI). I.V. House products increase dwell times, reducing the need for PIV restarts thereby contributing to vein preservation.

Standard 4: Organization of Infusion Vascular Access Services, page S23–S24

Standard	How do I.V. House products meet these recommendations?
4.1 Infusion therapy requires interprofessional collaboration among all clinicians that prescribe, dispense, and administer a wide variety of solutions, medications, nutrition, and blood components, in addition to management and purchasing personnel. **Practice Recommendations** A. General … 6. Initiate and/or participate in interprofessional safety programs to reduce the number, risk, and costs of adverse events related to infusion/vascular access including: … f. Coordination of product evaluation, QI, staff development, and standardized EBPs, within and between health care organizations.	The I.V. House team works closely with hospital-based clinicians when trialing the TLC Splints, I.V. House UltraDomes, and I.V. House UltraDressings. Processes are in place for all trials and are based on Super Users or the most knowledgeable clinicians. Pre-trial work includes providing trial products, educational materials, badge buddies, posters, and evaluation forms. Hospital Nurse Champions are provided with product information and educational videos to share with clinicians prior to the arrival of the I.V. House team.

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Standard 5: Competency and Competency Assessment, page S26–S27

Standard	How do I.V. House products meet these recommendations?
5.2 Due to its invasive, high-risk nature, the clinician with responsibility for the safe delivery of infusion therapy and VAD insertion and/or management demonstrates competency with this role. **Practice Recommendations** … B. […] The absence of appropriate evidence-based education and skill development among clinicians with all levels of experience are 2 factors among many that lead to premature failure and high complication rates of short PIVCs. The absence of appropriate evidence-based education and skill development among clinicians with all levels of experience are 2 factors among many that lead to premature failure and high complication rates of short PIVCs. Variations in performance of CVAD insertion in a simulation laboratory emphasize the need for ongoing competency assessment. Experienced clinicians may not recognize their need for reconstruction of knowledge and skills to correct inaccuracies and improve techniques. … H. Employ a blended learning approach by combining a variety of methods to deliver education and training. This will improve learning outcomes, maximize use of resources, and allow flexibility.	I.V. House works directly with hospital nurse educators to provide training from initial trial through product rollout. Educational materials, including directions for use videos, are available 24/7 at www.ivhouse.com. Competency of I.V. House product usage is encouraged by requesting that nurses perform return demonstrations of product applications to the I.V. House team, and through bedside audits of products being used. I.V. House offers a wide variety of training options including written application instructions in each product package, directions for use videos, Tips and Tricks sheets, a Toe Strap Note, and a Finger Tape Note. We work directly with our hospital partners for in-service training to meet their needs for all shifts of nursing care.

Standard 6: Quality Improvement, page S31–S32

Standard	How do I.V. House products meet these recommendations?
6.1 Quality improvement (QI) activities are implemented to advance safety and excellence in infusion administration and VAD insertion and management. **Practice Recommendations** … B. … 2. Assess current gaps in practice and identify, minimize, and/or eliminate barriers to change and improvement; consider potential barriers including attitudes, time, and financial and physical resources. …	I.V. House works directly with hospital nurse educators to provide training. I.V. House educational materials have been created based on nurse feedback and best practices from our hospital partners around the world. I.V. House works directly with nurse champions to create systems to ensure a successful trial and smooth rollout.
8. Recognize that patient education may improve professional practice by increasing clinician adherence to recommended clinical practice and improve patient outcomes.	I.V. House encourages nurses to educate patients and their caregivers about early warning signs of complications using the Touch, Look, and Compare method outlined on page 11 of this booklet. In addition, directions for use videos are available for anyone at www.ivhouse.com.

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Standard 7: Evidence-Based Practice and Research, page S34	
Standard	**How do I.V. House products meet these recommendations?**
7.1 The clinician integrates evidence-based knowledge with clinical expertise and the patient's preferences and values in the current context when providing safe, effective, and patient-centered infusion therapy.	The I.V. House team works closely with nurses to create evidence-based projects when developing a trial.
Practice Recommendations A. Collaborate with health care team members and leadership to support a culture of EBP and research that advances safe and effective infusion therapy. ...	Involving units with a high number of peripheral IV insertions ensures an adequate amount of data can be collected to show the efficacy of using I.V. House products to reduce patient harm.
C. Participate in infusion therapy research activities that advance knowledge, considering the clinician's education, experience, and position; this includes activities such as participating on a research team or journal club, piloting new products within a research framework and Institutional Review Board (IRB) approval, and disseminating research findings to support EBP initiatives.	Collecting trial data, including nurse evaluations, allows hospitals to present findings to the appropriate parties, including Value Analysis and Materials Management. I.V. House supports hospitals that choose to publish trial results at conferences and in medical journals.

Standard 8: Patient Education, page S35–S36	
Standard	**How do I.V. House products meet these recommendations?**
8.1 The patient/caregiver is educated about the prescribed infusion therapy and plan of care including, but not limited to, the purpose and expected outcome(s) and/or goal(s) of treatment, expected duration of therapy, risks and benefits, infusion therapy administration, VAD options and expected care, potential complications, adverse effects associated with treatment or therapy, and how to access health care services as needed. 8.2 Teaching strategies and learning materials are congruent with the knowledge and skills being taught and encompass patient/caregiver learning needs, abilities, and resources.	When a TLC Splint, I.V. House UltraDome, or I.V. House UltraDressing is in place, I.V. House team members encourage nurses to teach the patient or caregiver self-monitoring techniques. I.V. House recommends the Touch, Look, and Compare method to identify early warning signs of complications such as changes in temperature, color, and swelling; and comparison to the opposite extremity for similar size and proportions. Empowering patients and parents with tools to identify early warning signs of complications creates a partnership with their healthcare team. I.V. House In-Service materials are available to patients and caregivers at www.ivhouse.com.

 *Endnotes available on pages 43–44

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Standard 11: Adverse and Serious Adverse Events, page S43	
Standard	**How do I.V. House products meet these recommendations?**
11.1 Adverse events, serious adverse events (e.g., sentinel events), or close calls associated with infusion therapy and/or vascular access devices (VADs) are documented and reported within the health care organization and to the appropriate regulatory body when required. **Practice Recommendations** ... D. Investigate serious adverse events immediately to ensure prompt action and improve safety. The process includes a root cause analysis (RCA) or other systematic investigation and analysis to improve quality and safety. Organizations must have a process to determine which serious events require an RCA.	I.V. House has a Quality Management System (QMS) that employs risk-based assessment. Through the QMS the I.V. House team questions and audits the organization's processes to eliminate the potential for nonconformities of products and to consistently meet customer requirements. I.V. House also strives to continually enhance customer satisfaction. Although there has never been a reported case of a serious adverse event related to I.V. House products, we have a process in place to determine the root cause if such a problem should occur. In part, this process includes the implementation, validation, and effectiveness of product improvements.

Standard 12: Product Evaluation, Integrity, and Defect Reporting, page S45	
Standard	**How do I.V. House products meet these recommendations?**
12.1 Clinician end users are involved in the evaluation of VAD and/or infusion products, equipment, and technologies, including clinical application, performance, infection/complication prevention, safety, efficacy, acceptability, reliability, and cost. **Practice Recommendations** A. ... 1. Include an interprofessional group of direct and indirect clinician end users (e.g., staff with human factors training, nurses, infection preventionists, physicians, biomedical engineers, information technologists, pharmacists, and patient representatives) in the product evaluation process. ... 5. Develop data collection tools for analysis and ongoing monitoring. 6. Provide education and training for use of the product/equipment selected for evaluation; consider support/involvement by the manufacturer in product education. B. ... ... 2. Use a structured and objective approach when investigating problems associated with medical devices, which may include issues such as device malfunction and user error; identify the need for additional clinician education.	For more than the 30 years, I.V. House has developed several data gathering options to involve clinician end users in the evaluation of products during trial and following rollout. In addition, I.V. House invites hospital partners to participate in annual customer satisfaction surveys designed to encourage ongoing product improvements. I.V. House products are thoughtfully designed to consider Human Factors and Ergonomics to fit the anatomy of each patient, while improving clinician workflows. Evaluation forms (paper and electronic) are provided to each hospital to capture nurse feedback. Clinician education is available from I.V. House staff and through educational materials provided in product packaging and online at www.ivhouse.com. Any claims made of product malfunction are immediately investigated. If a malfunction occurs, I.V. House asks hospitals to provide documentation and return of products for research and development. If user error is the cause I.V. House provides additional training as needed. Detailed training materials are available at www.ivhouse.com.

 *Endnotes available on pages 43–44

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Standard 14: Latex Sensitivity or Allergy, page S49

Standard	How do I.V. House products meet these recommendations?
14.1 Exposure to latex in the environment is minimized. **Practice Recommendations** G. ... 1. Review the label on medical devices, equipment, and supplies prior to use for the presence of latex, which is a component of product labeling required by the FDA.	All I.V. House products are latex-free. They are 100% free of DEHP and BPA, two industrial chemicals shown to harm human and environmental health. Additionally, all products are MRI Safe. Materials are nonconductive, non-magnetic, insulated, and will not become hot during an MRI scan.

Standard 34: Vascular Access Device Placement, page S97

Standard	How do I.V. House products meet these recommendations?
34.1 **Practice Recommendations** I. ... A. Consider implementation of a PIVC insertion bundle to improve insertion success or reduce complications. High-level synthesis studies investigated bundled PIVC insertion and management interventions; no clear evidence emerged to support a specific intervention bundle.	Hospitals that use I.V. House products in conjunction with complementary interventions including nonpharmacologic anxiety relief, appropriate gauge PIVC, ultrasound-guided IV, and IV site monitoring systems experience longer dwell times and fewer IV therapy-related complications. Results from a Southern California pediatric hospital evidence-based trial for Pediatric PIV Maintenance Bundle that included the I.V. House UltraDome and TLC Splints: A total of 59 children aged 0–18 participated with a total of 182 PIV sites. The IV maintenance bundle was used in 61 PIV sites (34%). There was a 25% loss of PIVs in sites that did not use a bundle and a 5% loss in sites that utilized the bundle. A recent trial in a pediatric hospital in the Northeast demonstrated a 40% decrease in moderate to severe infiltrations when using the IVH products.

Standard 38: Vascular Access Device Securement, page S108–S110

Standard	How do I.V. House products meet these recommendations?
38.1 VADs are secured to prevent complications associated with VAD motion at the insertion site and unintentional loss of access. 38.2 Methods used to secure the VAD do not interfere with the ability to routinely assess and monitor the access site or impede vascular circulation or delivery of the prescribed therapy. **Practice Recommendation** ... I. Do not use rolled bandages, with or without elastic properties, as a primary method of VAD securement, as they do not adequately secure the VAD.	The I.V. House UltraDome and I.V. House UltraDressing are designed to shield the IV catheter and tubing from mechanical manipulation caused by bumps and snags that can lead to dislodgment. The clear, ventilated plastic domes on I.V. House IV insertion site protection products make it easy to visually and manually assess the IV insertion site. All I.V. House products are designed to reduce the need for tape. Rolled bandages, No-Nos, and welcome sleeves are not recommended for use with I.V. House products because they obscure the IV insertion site and surrounding tissue.

*Endnotes available on pages 43–44

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Standard 39: Joint Stabilization, page S111–S112	
Standard	**How do I.V. House products meet these recommendations?**
39.1 Joint stabilization devices, such as an arm board or splint, are used to facilitate infusion delivery, maintain device functionality, and minimize infusion therapy complications and are not considered restraints.	The TLC® Splint is an ergonomically designed armboard that supports the area of flexion and places the joint in the functional position for IV therapy infusion.
Practice Recommendations A. The joint stabilization device is: 1. Used to facilitate infusion delivery, maintain device functionality, and minimize complications; however, avoid use if possible due to restricted movement of the stabilized body part.	The TLC Splint, when used in conjunction with complementary interventions, has been shown to minimize complications and increase dwell times.
2. Padded as needed and supports the area of flexion (e.g., hand, arm, elbow, foot) in order to maintain a functional position	The TLC Splint is a padded, single-use device and is available for the wrist, elbow, and foot. The device supports the anatomy of the patient, reduces pressure on the stabilized joint, and soft padding promotes comfort.
3. Applied in a manner that permits visual inspection and assessment of the vascular access site and vascular pathway and does not exert pressure that will cause circulatory constriction, pressure injury, or nerve damage in the area of flexion or under the device.	See-through openings on the TLC Splint allow nurses to Touch, Look, and Compare the IV insertion site with the opposite extremity for easier visual and manual assessment. When correctly secured, the soft Velcro® straps allow adequate circulation and support. The Velcro® straps reduce skin damage that can be caused by over use of tape. We recommend double-backed tape when using the TLC Splint without straps.
4. Used when a PIVC is placed in the antecubital fossa. This site is not recommended, but if a PIVC is present, the joint is stabilized.	The TLC Splint for the elbow supports the area of flexion when the vein in the antecubital space is used for IV therapy infusion.

Standard 40: Site Protection, page S112–S113	
Standard	**How do I.V. House products meet these recommendations?**
40.1 Site protection and/or physical immobilization devices (e.g., clear VAD covers and mitts) are used to protect VADs or VAD sites, thus maintaining infusion therapy and device functionality. 40.2 The use of physical immobilization devices (e.g., restraints) to protect VADs or VAD sites is not routinely implemented except for nonviolent behavior that hinders medical treatment, such as infusion therapy.	Using the I.V. House UltraDressing® and I.V. House UltraDome® protects the IV insertion site, catheter, and loop of tubing to prevent accidental dislodgment and extend dwell times.
Practice Recommendations A. Use site protection and/or physical immobilization devices for specific patient populations, including pediatric, elderly, or those with cognitive dysfunction at risk for the VAD being accidentally dislodged or removed.	Combining I.V. House site protection products with the TLC Splint stabilizes the area of flexion. See-through openings on the TLC Splint provide a 360° view of the extremity.
B. ... 2. Used in a manner that permits visual inspection and assessment of the vascular access site and vascular pathway and does not exert pressure that will cause circulatory constriction, pressure injuries, or nerve damage under the device, and in accordance with manufacturers' directions for use. Physical immobilization devices should be distal to the VAD site, so circulation is not impeded. The site protection method or selected immobilization device should not interfere with the prescribed infusion rate, delivery method, or catheter securement.	All I.V. House products allow nurses to visually and manually assess the IV insertion site and surrounding tissue to spot early warning signs of complications such as changes in color, temperature, swelling, and the comparison of opposite extremity for similar size and proportions. The I.V. House UltraDressing and I.V. House UltraDome protect the IV insertion site. The clear, ventilated plastic dome preserves vasculature by shielding the IV catheter and loop of tubing from bumps and snags that can lead to movement inside the vascular wall, or accidental dislodgment. If an area of flexion is used for IV therapy, a TLC Splint, available for the wrist, elbow, or foot, can be used to stabilize the area of flexion. All I.V. House devices are designed to extend dwell times and should be removed when IV therapy is discontinued.

 *Endnotes available on pages 43–44

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Standard 42: Vascular Access Device Site Care & Dressing Changes, page S119–S121	
Standard	**How do I.V. House products meet these recommendations?**
42.1 The entire infusion system, from the VAD insertion site to the solution container, is routinely assessed for system integrity, infusion accuracy, identification of complications, and expiration dates of the infusate, dressing, and administration set. … 42.3 Site care, including skin antisepsis and dressing changes, is performed at established intervals and immediately if the dressing integrity becomes compromised (e.g., lifted/detached on any border edge or within transparent portion of dressing; visibly soiled; presence of moisture, drainage, or blood) or compromised skin integrity is present under the dressing. …	The clear, ventilated plastic dome on the I.V. House UltraDressing and I.V. House UltraDome provides exceptional access to the vascular insertion site for proactive care and maintenance. Health care providers simply lift the device to visually and manually inspect the IV insertion site for signs of complications.
Practice Recommendations … D. Assess VAD site, entire infusion system, and patient for signs of complications at a frequency dependent on patient factors, such as age, condition, and cognition; type/frequency of infusate; and health care setting: 2. In inpatient and nursing facilities, assess PIVCs at least every 4 hours; every 1 to 2 hours for patients who are critically ill/sedated or have cognitive deficits; hourly for neonatal/pediatric patients; and more often for patients receiving infusions of vesicant medications. …	The see-through openings on the TLC Splint, which is available for the wrist, elbow, and foot, allow health care providers to Touch, Look, and Compare the IV insertion site with the opposite extremity to check for early warning signs of complications such as changes in color, temperature, and swelling.
O. Do not use rolled bandages, with or without elastic properties, as a primary method of VAD securement, as they do not adequately secure the VAD.	I.V. House products are designed to reduce use of tape and rolled bandages that may impede the infusion of IV fluids or obstruct the view of the IV insertion site.

Standard 45: Vascular Access Device Removal, page S133–S134	
Standard	**How do I.V. House products meet these recommendations?**
45.3 VADs are not removed based solely on length of dwell time, because there is no known optimal dwell time. **Practice Recommendations** I. Short and Long PIVCs and Midline Catheters … B. Remove PIVCs and midline catheters in pediatric and adult patients when clinically indicated, based on findings from site assessment and/or clinical signs and symptoms of systemic complications.	The TLC Splint, I.V. House UltraDressing, and I.V. House UltraDome are designed to increase dwell time by stabilizing the area of flexion and protecting the IV catheter and loop of tubing. All I.V. House devices incorporate features to enhance patient safety and improve nurse efficiency during the care and maintenance of the IV insertion site and surrounding tissues. Use of I.V. House devices is part of a proactive and intentional approach to vein preservation.

 *Endnotes available on pages 43–44

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Standard 47: Infiltration and Extravasation, page S142–S145	
Standard	**How do I.V. House products meet these recommendations?**
47.1 The risk of infiltration and extravasation is reduced through careful selection of the most appropriate VAD and insertion site and through establishment of VAD patency prior to and during infusion therapy.	I.V. House products are designed to provide exceptional access to the IV insertion site and surrounding tissue during routine care and maintenance practices. Early detection of complications, including infiltration and extravasation, help promote patient safety.
47.2 Peripheral and CVAD sites are regularly assessed for signs and/or symptoms of infiltration and extravasation before and during each intermittent infusion and on regular intervals during continuous infusions.	I.V. House products are designed to provide exceptional access to the IV insertion site and surrounding tissue during routine care and maintenance practices. Early detection of complications, including infiltration and extravasation, help promote patient safety.
47.3 Appropriate intervention(s) are implemented immediately upon recognition of infiltration/extravasation as determined by the characteristics of the solution or medication escaping from the vein.	Health care providers are encouraged to educate all stakeholders including patients, families, and caregivers, about the warning signs of complications to improve clinical outcomes.
Practice Recommendations C. … … 2. Assess the risk of mechanical causes of infiltration/extravasation, which include: catheter placement in an area of flexion; catheter size insertion technique and inserter experience; improper needle placement/needle dislodgement of an implanted vascular access port; partial dislodgement of VAD, including 1 or more lumen exit sites of a multilumen, staggered tip CVAD; inadequate securement; normal body movement (e.g., respiratory and cardiac function); vein thrombosis or stenosis proximal to (located above) the insertion site and tip location, limiting blood flow.	I.V. House products are designed to protect the catheter and extension tubing that can frequently cause mechanical manipulation. Covering the extension tubing protects it from getting caught on something, which could lead to accidental dislodgment.

PediNeoSIG Position Paper: Minimum Education and Training for Pediatric and Neonatal IV Insertion for all Clinicians

December 2020	
Position of PediNeoSIG	**How do I.V. House products meet these recommendations?**
Intravenous (IV) insertion is a common procedure for hospitalized pediatric patients and first-attempt success rates range from 64% to 74% with an average of 2.1 attempts.	I.V. House products are designed to improve access for care and maintenance of the IV insertion site.
[...] Establishing a vascular access curriculum to include patient assessment, vessel anatomy and physiology, proper device selection, vein selection, appropriate catheter size and length, imaging modalities, insertion techniques, securement, dressing, and documentation is essential.	I.V. House works directly with nurses and hospitals to train teams on best practices for the application of the TLC Splint, I.V. House UltraDome, and I.V. House UltraDressing.
Practice Recommendations 4. Essential components to training should include: ... b. Use of a standardized, evidence-based device algorithm to select the most appropriate device. Collaborate with care team, provider, and patient/family for shared decision making. c. Pre-procedural education and preparation with patient and family for IV insertion. Plan should be individualized based on the age, developmental level, culture, and previous experiences with IV insertion.	I.V. House will, upon request, provide hospitals with trial results from facilities with similar populations. In addition, I.V. House has educational materials suitable for nurses, patients, and their caregivers to help them spot early warning signs of IV therapy complications.
... g. Securement of IV catheter with manufactured securement products and dressings to reduce the risk of catheter complications.	The see-through openings of the TLC® Splints offer a 360° view of the IV insertion site and surrounding tissue so health care providers can easily assess the extremity.
Successfully completing pediatric PIV insertion is a multifactorial process that involves a skilled clinician with an understanding of the best practice evidence to provide safe, age-appropriate care. Minimum recommendations for healthcare provider proficiency with pediatric IV insertion and critical thinking skills are essential in this commonly performed invasive procedure.	Clear, ventilated plastic domes on the I.V. House UltraDressing® and I.V. House UltraDome® provide access to the IV catheter to allow for routine assessments. I.V. House recommends nurses educate all stakeholders, including patients and guardians, about the early warning signs of complications.

Centers for Disease Control and Prevention

Replacement of Peripheral and Midline Catheters
Recommendations
1. There is no need to replace peripheral catheters more frequently than every 72–96 hours to reduce risk of infection and phlebitis in adults [36, 140, 141]. Category 1B
2. No recommendation is made regarding replacement of peripheral catheters in adults only when clinically indicated [142–144].
3. Replace peripheral catheters in children only when clinically indicated [32, 33]. Category 1B

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