

Nuove tecniche di visualizzazione delle vene superficiali

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INS Standards of Practice 2006

Standard #37, Site selection

- ‘The nurse should consider using visualization technologies that aid in vein identification and selection’
 - Practice criteria statement for peripheral venous catheters (short and midline), central venous catheters (PICC, non-tunneled, tunneled, implanted ports), arterial.
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Imaging

- Vene profonde (> 7 mm)
 - Visualizzazione ecografica
 - Vene superficiali (< 7 mm)
 - Palpazione
 - Visione in trasparenza
 - Visualizzazione con tecnologie specifiche
 - Transilluminazione
 - Riflessione di raggi infrarossi (NIR)
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Visualizzazione per contatto

- Mediante transilluminazione
 - VeinLite
 - Venoscope





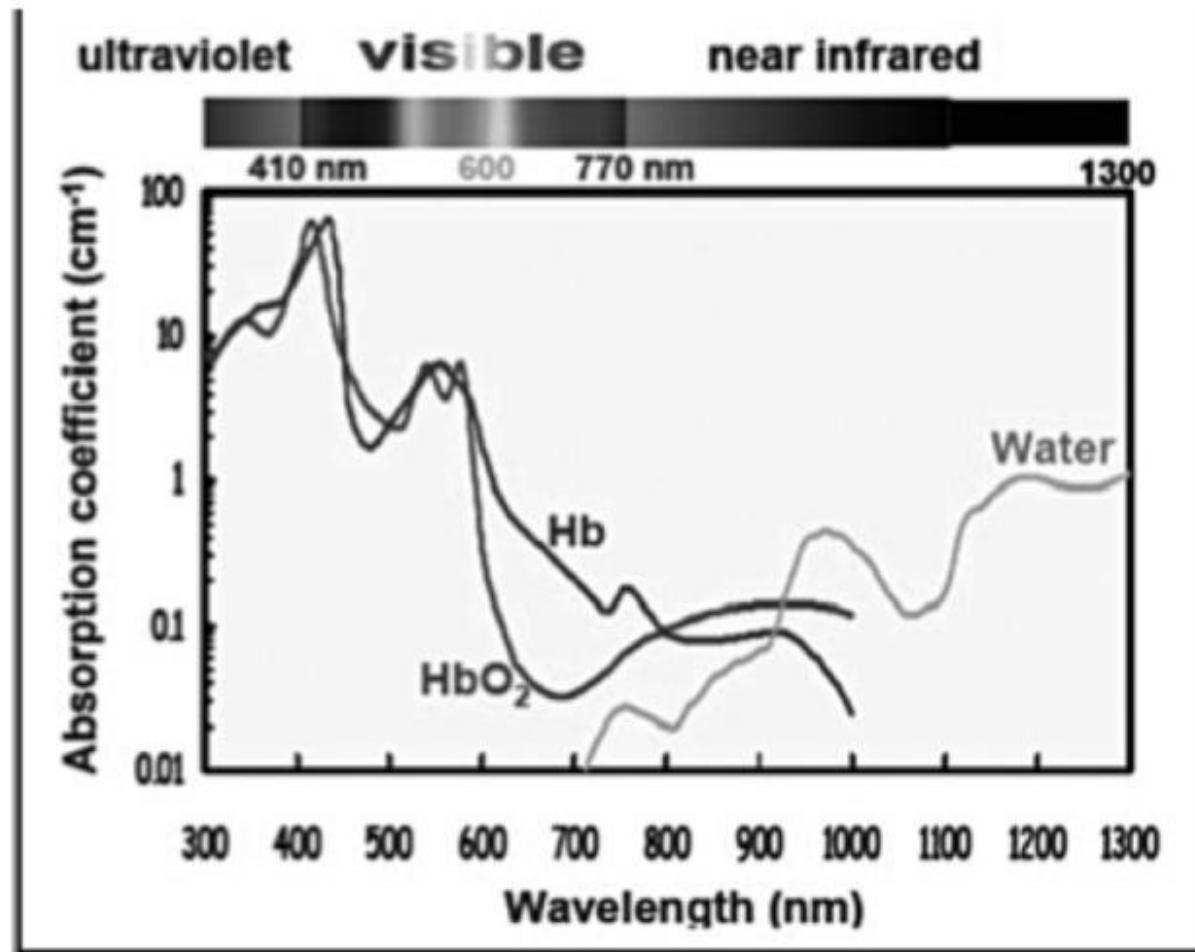
Visualizzazione mediante fasci di infrarossi (near-infrared)

- AccuVein
 - VeinViewer
 - VeinSite
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Visualizzazione mediante fasci di infrarossi (near-infrared)

- Diodi ad emissione che producono una luce a infrarossi con un picco di lunghezza d'onda di 760nm
 - L'irradiazione infrarossa è in grado di penetrare la pelle ad angolo retto fino a 10mm di profondità da una distanza di 61cm
 - L'emoglobina presente nel sangue venoso dei vasi assorbe la luce di questa lunghezza d'onda mentre le strutture circostanti come il grasso sottocutaneo la riflettono
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760nm = assorbimento da parte della Hb desaturata



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- Le apparecchiature ad emissione di luce infrarossa in commercio sono in grado di emettere infrarossi a diversa lunghezza d'onda e con vari colori visibili sulla pelle del paziente (verde, rosso, blue)
 - Esistono diversi metodi che permettono la venipuntura utilizzando la metodica di individuazione delle vene con la luce ad infrarossi (metodo diretto, metodi indiretto)
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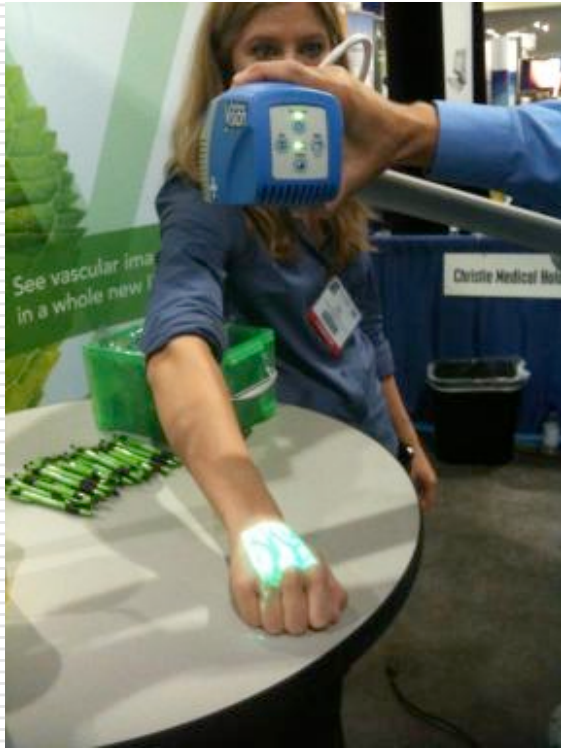
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- **Diretto (Veinsite):** visualizzazione diretta della vena da parte dell'operatore
 - **Indiretto (Accuvein, Veinviewer):** la luce infrarossa permette la visualizzazione indiretta della vena sulla pelle del paziente
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Visualizzazione mediante fasci di infrarossi (near-infrared)

□ VeinViewer



VeinViewer- Vision



VeinViewer- Vision

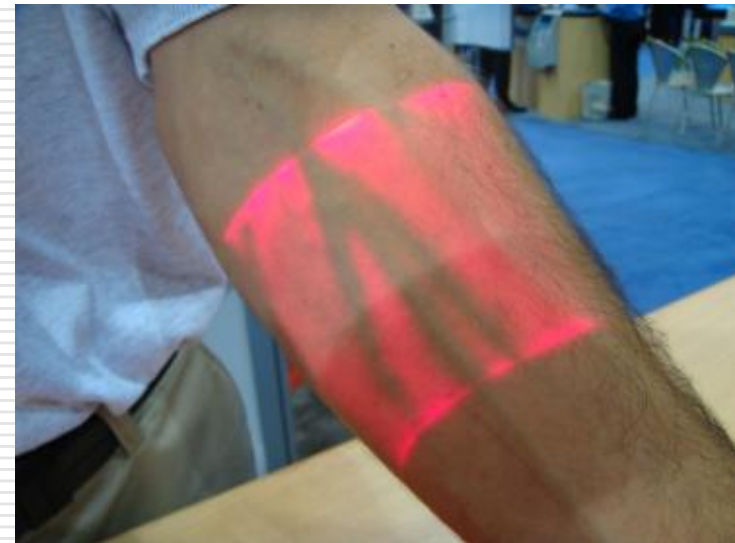


VeinViewer- Vision



Visualizzazione mediante fasci di infrarossi (near-infrared)

□ AccuVein





Equipment

- Stethoscope
- Ergonomic handle
- Stethoscope
- Stethoscope

Imagine how you could...
Now you can...

AccuVer

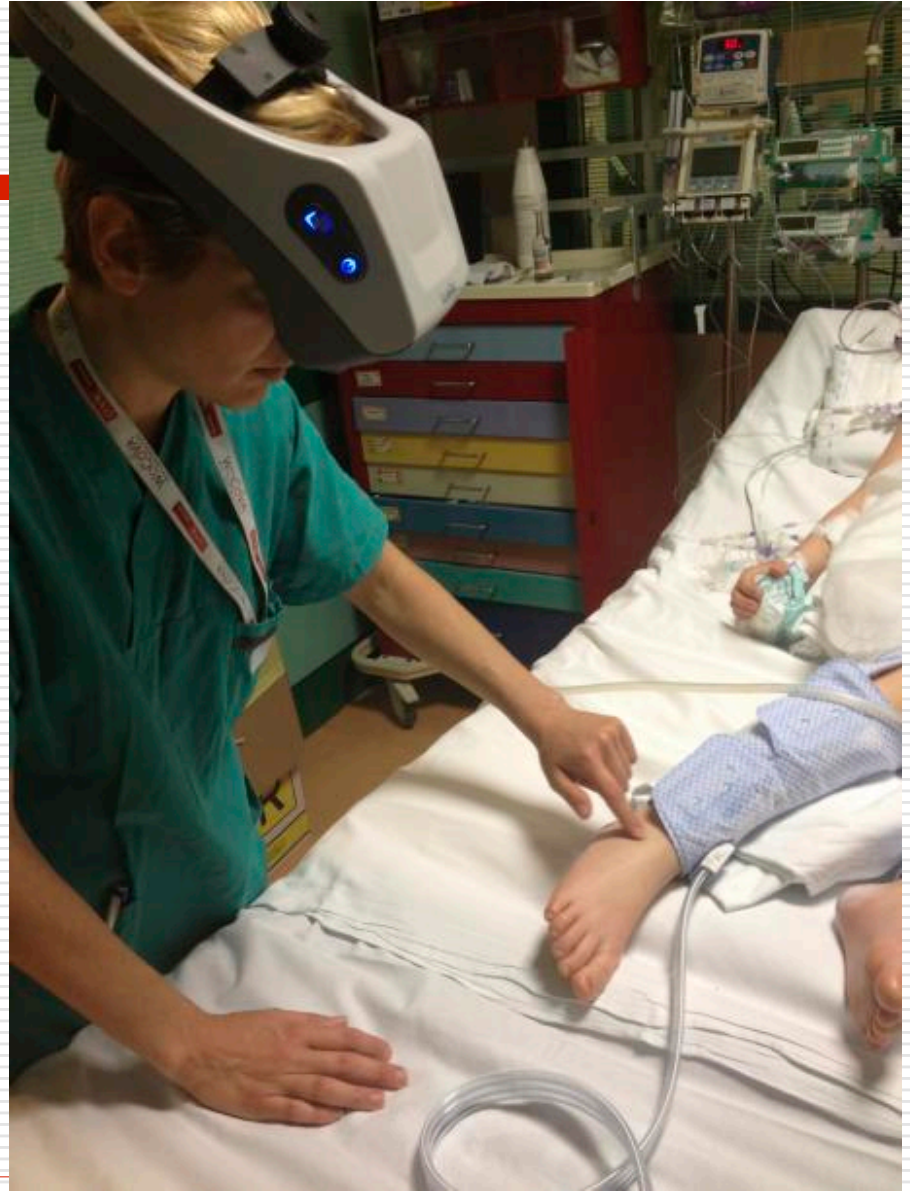
AccuVer

AccuVer

AccuVer

Veinsite





Potenziati vantaggi della visualizzazione delle vene superficiali mediante NIR

- Diminuzione tentativi venipuntura
 - Successo al primo tentativo
 - Riduzione dei tempi
 - Riduzione dei costi
 - Maggior comfort del paziente
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Vantaggi specifici della tecnologia a riflessione di infrarossi

- ❑ Utilizzabile su qualunque paziente, di qualunque età o razza
 - ❑ Mantiene libere le mani dell'operatore
 - ❑ Non invasivo, innocuo, non riscalda
 - ❑ Non rischio di contaminazione
 - ❑ Permette di individuare in modo dettagliato il tragitto delle vene, le biforcazioni, le valvole, etc.
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Problemi

- ❑ Pochi studi clinici
 - ❑ Pochi studi clinici randomizzati
 - ❑ Poca chiarezza sugli 'endpoints'
 - ❑ Scarsa focalizzazione sul problema del training
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Efficacy of a near-infrared light device in pediatric intravenous cannulation: a randomized controlled trial.

Perry A et al. Pediatr Emerg Med 2011

- Pts < 20yrs of age
 - RCT: 123 pts; if standard blind technique failed Veinviewer was used as failed back technique
 - First-attempt success rate for IV placement was nonsignificantly higher without than with the assistance of a near-infrared light device in a high-volume pediatric ED
 - Nurses placing IVs did report several benefits to use of the device with specific patient groups
 - The role of the device in these patients is still to be demonstrated
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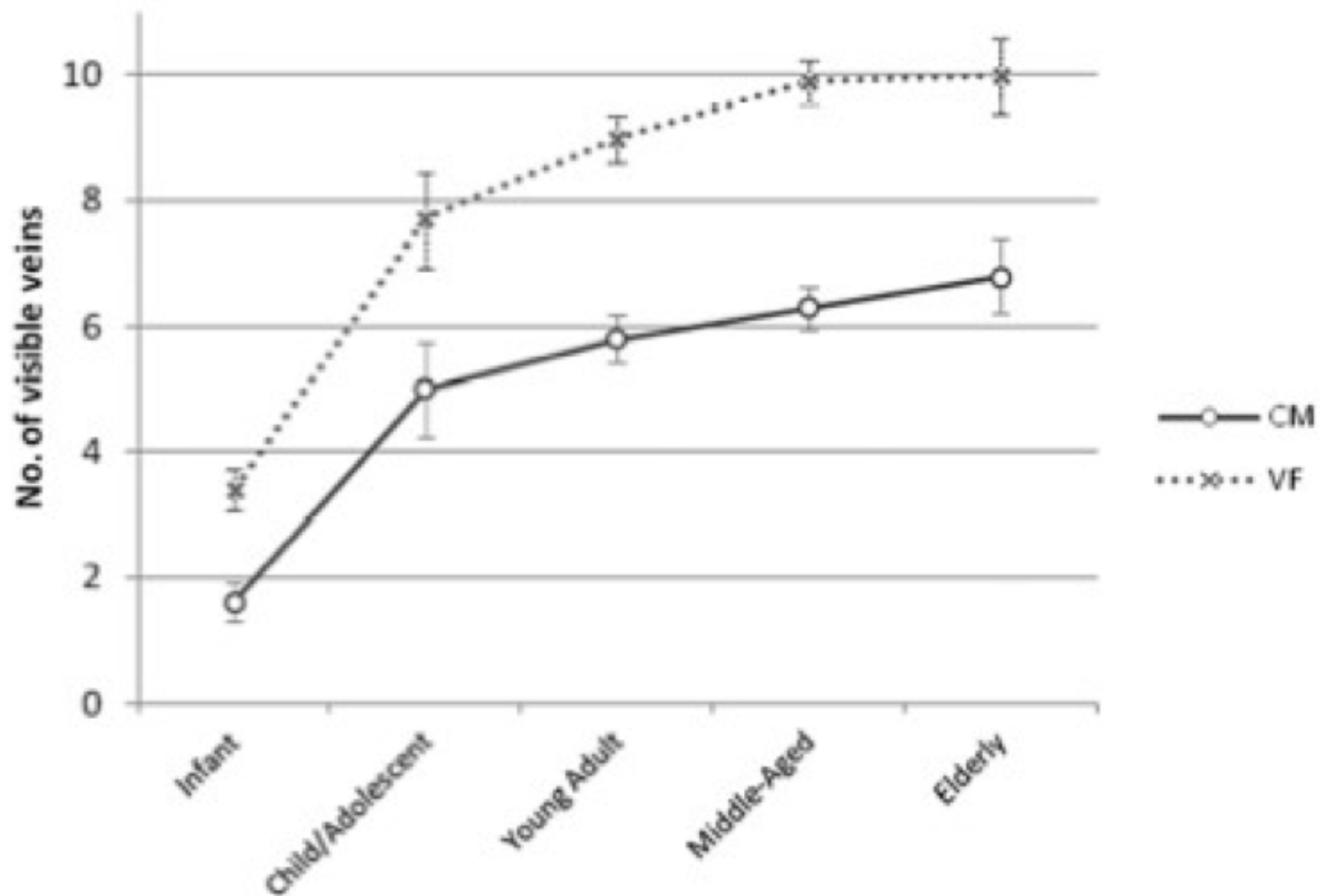
Efficacy of VeinViewer in pediatric peripheral intravenous access: a randomized controlled trial.

Kim M et al. Eur J Pediatr 2012

- RCT: Veinviewer vs blind
 - Children aging from <1 month to 16 yrs
 - Difficult intravenous access score used
 - 111 pts.
 - VeinViewer® facilitated peripheral venous access for pediatric patients with difficult veins, which enhanced first-attempt success rates
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**Vein Visualization:
 Vein Demographics and the Efficacy of a New Infrared Vein
 Finder Technology**

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EDITORIAL II

Difficult peripheral veins: turn on the lights

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There are three main unresolved issues regarding the use of NIR technology that makes its application still far from real life and clinical practice in our hospitals.

First: what about training? It is not clear how operators should be trained in the use of this new technology. Most of the studies do not report how many procedures the operators had to perform before being considered proficient with this new method. To define an operator proficient in a new technology or procedure, two main outcomes should be satisfied: goal achieved and time to success. Considering these devices, first-time successful cannulation should be considered the main goal and a learning curve should be calculated on this parameter;¹² this would suggest the average number of procedures required before obtaining a minimal training for getting proficiency.

Cannulation time is not less important, if we consider that these portable devices should also be used in the emergency room to obtain a prompt venous access. It is mandatory to define a training curriculum on the use of NIR devices, if we want to use them properly every time, those superficial veins are not easily visible, palpable, or both.

Second: cost-effectiveness. In other words, is this technology affordable in this period of international financial crisis? New technologies may be difficult to be accepted by our hospital managers, if not supported by a proper economical and clinical rationale. A budget impact analysis¹³ of this technology should include not only the raw cost of the device (from \$4500 up to \$25 000) and the cost of training vs the time-saving benefit, but also the advantage of a convincing improvement in the quality of venous cannulation in terms of perception of pain by

patients and handiness of the device by operators. Should the results of this analysis show a significant cost-effectiveness, the technique should be progressively introduced in the clinical practice, with the clinical goals of (i) preserving the peripheral vein patrimony of the patients and (ii) avoiding the risks associated with a potentially unnecessary central vein cannulation.¹⁴



Finally, there is a technical concern about vein visualization. Difficult venous cannulation may be related to the small diameter of the vein (as in infants) or to their deep location (as in obese patients) or to poor visibility or palpability due to other factors (oedema, pigmentation, etc.). It is still not clear whether NIR devices can be effective not only in venous visualization but also in venous cannulation; more specifically, since NIR technology does not provide a depth of field, accidental puncture of the posterior wall of the vein, and extravasation may easily occur. Ultrasound guidance has been proposed in recent years¹⁵¹⁶ to improve the visualization of difficult superficial veins in paediatric patients, but the results of these studies are controversial in terms of improved success rate, first-time success, and overall time to cannulation.

In conclusione: promesse (1)

- ❑ La tecnologia NIR si affermerà certamente come tecnica di imaging preferenziale per visualizzare e incannulare le vene superficiali
 - ❑ I suoi benefici saranno soprattutto evidenti in ambito pediatrico ma poi si estenderanno anche al paziente adulto
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In conclusione: promesse (2)

- ❑ I sistemi basati sulla tecnologia NIR si svilupperanno sempre di più, migliorando in termini di facilità d'uso, accuratezza e costo-efficacia
 - ❑ Tra i sistemi attualmente in commercio, i più promettenti sono quelli a visione diretta (Veinsite) piuttosto che a visione indiretta (VeinViewer, AccuVein)
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In conclusione: problemi

- ❑ Mancano ancora studi randomizzati che comprovino la efficacia e la costo-efficacia
 - ❑ Necessità di training appropriato
 - ❑ Limiti tecnici della visione 'a piatto'
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