

REFERENCE LIST



Patients at risk of VND quotation

Venous needle dislodgement is a potentially life-threatening complication of dialysis that can happen to anyone in any dialysis setting throughout the world.

Patients with a well functioning AV fistula e.g. p> 25mmHg, amounts to 50% of all AV fistulas.

Low/Poor lighting in the room

Patients experiencing restlessness towards the end of the dialysis
Restlessness throughout

Patients with frequent blood pressure drops or muscle cramps

Patients covering the access during dialysis, this includes patients who are cold, sleeping, and are typically patients in beds

Patients with extensive hair growth around the access points, which makes fixation of the needles more difficult. Patients with skin conditions; allergies to patches, eczemas, extensive sweating

If venous pressure before treatment is below 25mmHg, the patient should be regarded as "high risk" for VND

Patients on nocturnal and/or home dialysis

Patients with history of VND

Patients who are mentally, cognitive, neurological impaired
Ex. Dementia, patients not understanding the implications of a VND, reduced sensitivity

Reference

Hurst⁴¹,
Axley, B et al⁴³

Polaschegg H-D¹

Polaschegg H-D¹⁸

Hurst J^{11,37}
Mactier et al¹⁵

Hurst J^{11,12, 37}
Mactier et al¹⁵
Liback-Pedersen L¹³
Polaschegg H-D²
VA Patient Safety Advisory¹⁶
VA Patient Safety Advisory¹⁷

Mc Cabe M^{8a}
Axley, B et al⁴³

Hurst J^{11,12,37}
Lindley E¹⁰
Polaschegg H-D^{1,2}
Sandroni S⁴
Liback-Pedersen E¹³
Almen⁷
VA Patient Safety Advisory¹⁶
VA Patient Safety Advisory¹⁷
Axley, B et al⁴³

Van Waeleghem, J-P et al⁹
McCabe M^{8,8a}
VA Patient Safety Advisory¹⁶

RPA. Keeping Kidney
Patients Safe⁴⁵

Axley, B et al⁴³

McCabe M^{8a}

McCabe^{8a}
Mactier et al¹⁵
Van Waeleghem, J-P et al⁹

Patients who are uncooperative	Liback-Pedersen E ¹³ Polaschegg H-D ²
Patients who are agitated	VA Patient Safety Advisory ¹⁶ VA Patient Safety Advisory ¹⁷ Axley, B et al ⁴³
Patients with fistulas located other than cephalic or brachial, e.g. locations which are not visible and easily submitted to friction	Van Waelegheem, J-P et al ⁹ Mactier et al ¹⁵
Patients with known small blood leakage oozing around the venous needle	Van Waelegheem, J-P et al ⁹ McCabe M ^{8a}
Patients with diabetes and frequent hypoglycemic episodes during HD therapy	McCabe M ^{8a}
All patients dialyzing with limited or without supervision e.g. Sleeping, Nocturnal Self care / Low care Home Isolation rooms in clinics, ICU	Van Waelegheem, J-P et al ⁹ McCabe M ^{8a} Almen ⁷ Sandroni S. EDTNA disc. Forum. ¹⁰ Lindley E ¹⁰ Hurst J ^{11,12,37} VA Patient Safety Advisory ¹⁶ VA Patient Safety Advisory ¹⁷ Axley, B et al ⁴³
Minimizing the risk of VND requires a combination of human skills, vigilance, and technology	Van Waelegheem JP et al ²⁶
Patient and staff awareness is important	Hurst ³⁷ Axley, B et al ⁴³
High acuity patients and patients with an altered mental status have a higher risk of VND	Martin Lascano ⁴⁰
VP alarm failed to detect VND until significant blood loss	VA Patient Safety Advisory ¹⁶ VA Patient Safety Advisory ¹⁷
Pressure drop caused by a cannula slipping: such event is usually too small to be detectable by the venous pressure monitor	Sandroni S ³ Almen ⁷ Polaschegg H-D ¹⁷ Van Waelegheem JP et al ²⁶
VP measuring is an unreliable method for detecting needle dislodgement	Polaschegg H-D ¹⁸ Pennsylvania Safety Advisory ³⁵

Venous needle dislodgement during hemodialysis without triggering the venous pressure alarm was reported in an online medical device safety report from 1998

Axley, B et al⁴³

Study to examine the success rate of VND detection in different types of dialysis access, using the venous pressure monitoring system. Only 29 % of fistula VNDs were detected related to discrepancies in pressure.

Ribitisch, W et al⁴⁴

Incidence and severity of incidents of VND

1/126 718 treatments, a catastrophic hemorrhage with 33% mortality = 136 deaths / year (=2/week)

1/62 500 serious bleeding (include cath & needles = 2/day)
5% has a needle come out (=200/day)

6.1% VND incidents (review of all type of incidents 562 over 1 year)

0,1% VND incidence rate

1/500 000 death

3% of treatments bleeding leading to corrective action (0,9% complete VND)

Post VND higher mortality risk due to infections

VND incidents are underreported

VND remains the most common cause of preventable death in dialysis and is a serious risk for the home patient.

414 episodes of fatal VND episodes are likely an underestimate

Without doubt VND is the most unexpected and potentially life-threatening complication in dialysis.

Cost related to VND

VND Costly complication

Minor VND 522-1183\$/blood transfusion

Sever VND 4 days hospital/blood/EPO/Plasma expanders.... 114 000\$ and up

Liability costs

Sandroni S⁴

VA Patient Safety Advisory¹⁶

RPA Renal Physicians
association¹⁹

Pennsylvania Safety Advisory³⁵

Almen⁷

Derek White, Gambro²⁰

T. Court: Physicist engineer
(PhD) Gambro R&D²¹

Derek White, Gambro²⁰

Robin Fields, Probuplica²⁵

Peter Laird³⁹

Martin Lascano^{40?}

Hurst⁴¹

Hurst²²

Hurst⁴¹

Cost of blood transfusion 522-1183\$/transfusion

Shander²³

Minimization of undetected VND

Minimization of undetected VND episodes can be aided by use of blood loss detection devices

Martin Lascano⁴⁰

Cost of blood transfusion 522-1183\$/transfusion
Blood transfusion related to 16% higher long term mortality

Shander²³
Surgenor²⁴

Only Hospital-operated facilities must report events under the Act 13 of the Medical Care Availability and Reduction of error Act of 2002 (freestanding dialysis clinics are excluded)

Pennsylvania Safety
Advisory³⁵

Electrical Safety

Further a direct electronic sensor such as a moisture or enuresis detector is not suitable since research have shown that a DC 5 V power supply could cause a micro shock by ionization in the skin.

Akihiro T et al³⁶

Literature list

Review includes the following publications:

1. Polaschegg, H-D. *Neglected Safety Aspects in Hemodialysis Machines and their Related Problems*. Hemodialysis Horizons, AMMI, 2006 Page 66.
2. Polaschegg, H-D. EDTNA/ERCA Conference, Prague, September 2008, Seminar, "Venous needle dislodgement: A safety issue. Possible methods for detection and prevention of major blood loss" Page 40.
3. Sandroni S. Venous needle dislodgement during hemodialysis An unresolved risk of catastrophic hemorrhage. Hemodialysis International 2005; 9102
4. Sandroni, S, Shockerman, T, Hayes-Light, K, *Catastrophic Hemorrhage from Venous Needle Dislodgement during Hemodialysis*, Journal of the American Society of Nephrology, volume 9, November 2008, Abstract issue.
5. Blagg CR. Home haemodialysis: 'home, home sweet, sweet home! "Nephrology 2005:10(3): Page 206–14
6. Esther Saner et al. Outcome of home haemodialysis patients: a case-cohort study. Nephrol Dial Transplant (2005) 20: Page 604–610
7. Ahlmén J, Gydell KH, Hadimeri H, Hernandez I, Rogland B, Strömbom U (2008) A new safety device for hemodialysis. Hemodialysis International 12 (2), Page 264–267.
8. McCabe M, et al, 38th EDTNA/ERCA International Conference Abstract.
 - a. Risk Assessment Tool Dundee
9. Van Waeleghem JP, Chamne M, Lindley, M, Pancirova, J, *Venous needle dislodgement How to minimize the risks*, Journal of renal Care 2008, Page 163-167.

10. Lindley E, EDTNA/ERCA Journal discussion club summary 2005.
www.edtnaerca.org/pages/education/journalclub/summary2005_2.php
11. Hurst, J, *Keep an Eye On Your Needle*, Kidney Times #312
12. Hurst, J, *Venous Needle Dislodgement*, Virgo publishing
<http://www.renalbusiness.com//09/09/2009>
13. Liback Pedersen, E. Allvorlig Blodtab under heamodialyse, Dialäsen 5, 2008
14. Cafazzo, J-A. et al, Barriers to the Adoption on Nocturnal Hemodialysis, American Society of Nephrology 2009, ISSN:1555-9041/404-0784
15. Mactier, R, Worth D, Artery Issue 41, March 2007
16. Patients Safety Advisory; Veteran Health Administration Warning System; Published by VA Central Office; October 21, 2008
<http://www.patientsafety.gov/alerts.html#2010>
17. Patient Safety Alert, Health Administration Warning System; Published by VA Central Office; July 6, 2010 <http://www.patientsafety.gov/alerts.html#2010>
18. P Polaschegg H.-D. (2010). Venous needle dislodgement: the pitfalls of venous pressure measurement and possible alternatives, a review. *Journal of Renal Care* 36(1), 41-48. Polaschegg, H-D. *Neglected Safety Aspects in*
19. RPA Renal Physicians Association, Health and Safety Survey to improve patient safety in end stage renal disease (2007)
20. Derik White, Gambro; Oral presentation EDTNA Congress Florence 2007 (Oral presentation)
21. T. Court: Physicist engineer (PhD) Gambro R&D – France, Dr M. Chawki Néphrologist Ermont- Cormeilles en Paris (95) France 2008
22. Hurst J, A Costly Complication: Venous Needle Dislodgement.
<http://www.renalbusiness.com/>
23. Shander, A., Hofmann, A., Ozawa, S., Theusinger, O., Gombotz, H., Spahn, D. "Activity-based Costs of Blood Transfusions in Surgical Patients at Four Hospitals." *Transfusion*. April 2010, Volume 50, Issue 4, Pages 753-765
24. Surgenor SD, et al; Northern New England Cardiovascular Disease Study Group. The association of perioperative red blood cell transfusions and decreased long-term survival after cardiac surgery. <http://www.ncbi.nlm.nih.gov/pubmed/19448195>
25. Robin Fields, When Needles Dislodge, Dialysis Can turn Deadly. ProPublica, Nov 10, 2010. www.propublica.org/article/when-needles-dislodge-dialysis-can-turn-deadly
26. Van Waelegheem JP, Chamne M, Lindley EJ, Olausson S, Pancirova J, Sundström M, Tattersall JE. Abstract: The tragedy of Venous Needle Dislodgement. ANNA 2011
27. Tricia West, R.N., BSN, MBA/HCM, PHN, LNC, Knowledge is Power.
http://www.pjwa.com/resources/knowledge_is_power.pdf
28. News coverage NBC,
http://dailynightly.msnbc.msn.com/_news/2010/12/30/5739313-diagnosing-dialysis-an-investigative-report
29. Robin Fields, In Dialysis, Life-Saving Care at Great Risk and Cost. ProPublica, Nov 9, 2010. <http://www.propublica.org/article/in-dialysis-life-saving-care-at-great-risk-and-cost/single>

30. Robin Fields, New Study Shows Higher mortality Risk at Fro-Profit Dialysis Chains, Dec 9, 2010. <http://www.propublica.org/article/new-study-shows-higher-mortality-risk-at-in-for-profit-dialysis-chains/single>
31. Robin Fields, <http://www.propublica.org/article/dialysis-data-once-confidential-shines-light-on-clinic-disparities>
32. Robin Fields, <http://www.propublica.org/article/feds-to-follow-propublica-release-dialysis-clinic-data>
33. Robin Fields, <http://www.propublica.org/article/sen-grassley-demands-information-on-dialysis-clinic-conditions>
34. Olsson P. Sundström M. Annotated Pro Publica Articles (25, 29-33)
35. Pennsylvania Patient Safety Authority. Vol 7, No. 3 September 2010. [http://patientsafetyauthority.org/ADVISORIES/AdvisoryLibrary/2010/Sep7\(3\)/Pages/87.aspx](http://patientsafetyauthority.org/ADVISORIES/AdvisoryLibrary/2010/Sep7(3)/Pages/87.aspx)
36. Takeuchi A, Ishida K, Morohoshi Y, Shinbo T, Hirose M, Ikeda N, Study of light transmission through gauze pad effected by blood or liquids to detect needle dislodgement. J Clin Monit Comput 2010; 24:35–39
37. Hurst Jane, RN, CLNC Venous Needle Dislodgement Precautions. AAKP RENALLIFE July volume 8. http://www.aakp.org/userfiles/File/AAKP_Renalife-July%202011%20-%20Final.pdf
38. J Cowperthwaite, A Rivers, M Sundström, J Hegbrant Abstract & oral presentation. ADC March 2011
39. Peter Laird, MD. Taking Hemodialysis Home Safely. Renal Business today October2011
40. Dr. Martin E. Lascano, Michael Bradley Andersen RN, Cleveland Clinics; Venous Needle Dislodgement Prevention in Hospital Based Hemodialysis. Abstract ASN November 2011
41. Hurst Jane, RN, CLNC, Venous Needle Dislodgement - A Universal Concern. European Nephrology, volume 5, issue 2, winter 2011. <http://www.touchbriefings.com/ebooks/A1uupa/euneph52/>
42. Michael Morales, CHT, CCHT-A, CCNT, CBNT, Grace Padilla-Kastenber, MPH, Venous Needle Dislodgement In Dialysis Clinic Settings. A Special Report. Feb 2013.
43. Axley, B, Speranza-Reid J, Williams H. (2012) Venous Needle Dislodgement in Patients on Hemodialysis. Nephrology Nursing Journal, 39(6), 435-445. <http://www.annanurse.org/download/reference/journal/vndArticle.pdf>
44. Ribitsch W, Schilcher G, Hafner-Giessauf H, Krisper P, Horina J, Rosenkranz A, Schneditz D. Prevalence of Detectable Venous Pressure Drops Expected with Venous Needle Dislodgement. *Seminars in Dialysis*. Sept-Oct 2014; 27 (507-11).
45. RPA Renal Physicians Association, Keeping Kidney Patients Safe. Venous Needle Dislodgement. http://www.kidneypatientsafety.org/didyouknow_needledislodgement.aspx
46. Faratro, R., Jeffries, J., Nesrallah, G. E. and MacRae, J. M. (2015), The care and keeping of vascular access for home hemodialysis patients. *Hemodial Int*, 19: S80–S92.