Vascular access devices are commonly inserted devices that facilitate the administration of fluids and drugs, as well as blood sampling. Despite their common use in clinical settings, these devices are prone to occlusion and failure, requiring replacement and exposing the patient to ongoing discomfort/pain, local vessel inflammation and risk of infection” Hawthorn et al (2019).

Abstract:

INTRODUCTION: Vascular access devices are commonly inserted devices that facilitate the administration of fluids and drugs, as well as blood sampling. Despite their common use in clinical settings, these devices are prone to occlusion and failure, requiring replacement and exposing the patient to ongoing discomfort/pain, local vessel inflammation and risk of infection. A range of insertion and maintenance strategies are employed to optimize device performance; however, the evidence base for many of these mechanisms is limited and the mechanisms contributing to the failure of these devices are largely unknown.

AIMS/OBJECTIVES: (1) To revisit existing understanding of blood, vessel physiology and biological fluid dynamics; (2) develop an understanding of the implications that different clinical practices have on vessel health, and (3) apply these understandings to vascular access device research and practice.

METHOD: Narrative review of biomedical and bioengineering studies related to vascular access practice.

RESULTS/OUTCOMES: Current vascular access device insertion and maintenance practice and policy are variable with limited clinical evidence to support the theoretical assumptions underpinning these regimens. This review demonstrates the physiological response to vascular access device insertion, flushing and infusion on the vein, blood components and blood flow. These appear to be associated with changes in intravascular fluid dynamics. Variable forces are at play that impact blood componentry and the endothelium. These may explain the mechanisms contributing to vascular access failure.
CONCLUSION: This review provides an update to our current knowledge and understanding of vascular physiology and the hemodynamic response, challenging some previously held assumptions regarding vascular access device maintenance, which require further investigation.

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