Lock Down Your Lines
With 3M™ Tegaderm™
IV Transparent Dressings

IV Secured Performance

3M Health Care
Abstract summary findings of research addressing the efficacy and safety of transparent dressings.

Transparent dressings were introduced over twenty years ago and have now become the dressing of choice for vascular access sites. Before transparent dressings were developed, IV dressings had not received much clinical attention or scrutiny. With the introduction of these thin film dressings, the potential for proliferation of skin bacteria and its influence on catheter-related infection became a key question. Early research\(^1\)\(^2\) concluded that the use of transparent dressings did not lead to excessive levels of skin colonization; however a 1992 publication\(^3\) renewed this debate.

To address this concern, “high MVTR” (moisture vapour transmission rate) transparent dressings were introduced in the early 1990’s. The expectation was that bacterial re-growth under these newer dressings would be minimized, thus reducing the risk of catheter-related infection. However, “high MVTR” was narrowly defined by laboratory bench data, which does not correlate with actual dressing performance.

Both of these questions have been clearly answered through repeated large, prospective randomized clinical trials, most of which were conducted with high-risk central venous catheters in critical care patients. However, the debate about the benefit of “high MVTR” dressings continues, despite the lack of clinical evidence to support these claims. In 1994, a literature review concluded, “the more highly permeable transparent dressings have not shown to reduce the incidence of catheter-related infection...”\(^4\) Also, in 1997, a meta-analysis concluded that “Transparent Polyurethane Dressings Do Not Increase the Risk of Central Venous Catheter-related Blood Stream Infections?"
3M™ Tegaderm™ Transparent dressings are the most widely studied of all transparent dressings – across different institutions, care settings and patient populations. Reported here are the abstract summary findings of research that address the efficacy and safety of transparent dressings – most of which included 3M™ Tegaderm™ Transparent dressings in the study protocols. The results are consistent.

3M™ Tegaderm™ Transparent dressings inhibit bacterial growth vs tape and gauze. And, Tegaderm dressings on skin perform the same as those promoted as high MVTR in terms of evaporation and bacterial growth.

Note: The following abstracts are excerpts from the original articles. A complete list is included on page twelve.

1. Rhode, Abstract APIC, May 1983
"A prospective, randomized trial comparing a transparent dressing and a dry gauze on the exit site of long term central venous catheters of hemodialysis patients."

This prospective randomized clinical trial was conducted over a 6 month period on N = 58 hemodialysis patients. This study equals 4286 catheter days. Each patient was randomized to receive either a transparent dressing changed weekly (29 patients) or sterile gauze dressing (29 patients) changed three times per week. The study monitored bacteremia rates, costs and quality of life scores using SF-36.™

Results included no difference in bacteremia rates, exit sites, or local infections; transparent dressings allowed for fewer dressing changes; treatment costs were lowered – $4.72 vs $7.60/week for gauze dressings; there was no significant local complications at the exit site; and, there was no observable unfavourable impact on quality of life.


"Investigation of bacterial growth and moisture handling properties of transparent dressings"

This study was a prospective, randomized block, controlled comparison of bacterial flora and moisture vapour transmission under various dressings (3M™ Tegaderm™, 3M™ Tegaderm™ HP, Opsite™ IV3000, Sterile Gauze Dressings). N = 54 healthy volunteers wore dressings on the pectoral region of the chest, applied in a randomized balanced block design. Measurements included: Servo Med Evaporimeter was used to measure evaporation rates (MVTR) on the skin; skin flora samples were cultured in duplicate on selective and differential media; and skin condition assessed after dressing removal.

The results from this study show no significant difference in bacterial counts among the three transparent dressings at 5 days; significantly lower bacterial counts with all three transparent dressings compared with tape and gauze at 5 days; (p<0.0001); no significant difference in evaporation of moisture through the dressing; no significant difference in accumulation of moisture under the dressing; and no correlation between bench MVTR data and actual evaporation properties when measure on skin.

“The use of gauze vs transparent dressings for peripheral intravenous catheter sites”.

This utilization review was completed to determine if the data noted in the meta-analysis completed by Hoffman et al in 1992 was different than the hospital’s experience – they were currently using transparent dressings for peripheral catheters. The meta-analysis stated that transparent dressings increased infection risk. The authors completed a research review on the same articles reviewed by Hoffman et al. Their objective was to determine if this difference warranted a practice change back to Tape and Gauze.

The results of their findings concluded that the results of the meta-analysis did not warrant a change in practice back to gauze dressings.


“Do dressings with increased permeability reduce the incidence of central venous catheter-related sepsis”

The incidence of catheter-related sepsis associated with the use of Tegaderm® or Opsite IV3000® dressings on 100 critically ill patients with liver disease was studied. All the patients had central venous catheters in situ and they were randomly assigned to one of the two dressings. In this study the sites of insertion were assessed at each dressing change, together with any fluid under the dressing. No statistically significant difference between the two dressings was found in accumulation of fluid, skin microbial colonization, local infection or systemic infection of patients in our sample. There was no apparent advantage to using the more permeable Opsite IV3000® dressing.

"A prospective, randomized trial of gauze and two polyurethane dressings for site care of pulmonary artery catheters: Implications for catheter management"

The objective of this study was to compare the safety of a conventional polyurethane transparent dressing and a novel highly permeable polyurethane dressing, as compared with standard gauze and tape, as site dressings for pulmonary artery catheters; and to rigorously determine the sources of bloodstream infections deriving from these catheters.

A prospective, randomized, clinical trial of gauze and two polyurethane dressings for site care of pulmonary artery catheters was completed. N = 442 adult intensive care patients with pulmonary artery catheters were randomized at the time of insertion to have one of three dressing regimens: a) sterile gauze and tape (control), replaced every 2 days; b) a conventional polyurethane dressing, replaced every 5 days; or c) a highly permeable polyurethane dressing, also replaced every 5 days. Two thirds of the catheters had been inserted in the operating room and one third had been inserted in an ICU. The researchers concluded that "neither of the polyurethane dressings studied was associated with an increased risk of device-related infection compared with gauze and tape, even when left on for ≥ 5 days, [therefore] both polyurethane dressings are safe for use with pulmonary artery catheters."

"A Prospective, Randomized Trial of Gauze and Two Polyurethane Dressings for Site Care of Pulmonary Artery Catheters: Implications for Catheter Management." Maki, DG; Stolz, SS; Wheeler, S; Mermel, LA Critical Care Medicine, Vol. 22, No. 11, 1994, pg 1729-1737.

"A comparison of two transparent film-type dressings in central venous therapy"

A prospective randomized clinical trial has been conducted to compare the clinical performance, with prolonged use, of two film-type transparent dressings used over subclavian and jugular single-lumen venous catheters. ‘OpSite’, a traditional dressing with a moderate moisture vapour permeability was compared with a new dressing of high moisture vapour permeability, ‘OpSite IV3000’. Information was collected daily to assess the nature and incidence of complications, dressing durability and the ease of application and removal. N = 101 patients provided two well-matched populations receiving a total of 153 dressings for a total of 780 catheter-days. No differences between the two dressings were noted with respect to the incidence of complications, such as moisture accumulation or lifting, and dressing
durability. The low incidence of catheter-related sepsis (‘OpSite’ group three episodes and ‘OpSite IV3000’ group one episode) suggests that transparent dressings do not increase this risk. This clinical study demonstrated the new ‘OpSite IV3000’ to be easier to handle, leading to better application, improved catheter fixation and easy removal.

A Comparison of Two Transparent Film-Type Dressings in Central Venous Therapy” Wille JC, vanOud Ablias B, Thevess, APM. Journal of Hospital Infection, Vol.23, 1993, pg 113-121.

“Prevention of central venous catheter-related infections by using maximal sterile barrier precautions during insertion”

This prospective randomized trial in a 500-bed cancer referral centre investigated whether the use of maximal sterile barrier precautions (consisting of mask, cap, sterile gloves, gown, and large drape) would lower the risk of acquiring catheter-related infections.

Patients were randomized to have their nontunneled central catheter inserted under maximal sterile barrier precautions or control precautions (sterile gloves and small drape only). All patients were followed for 3 months post insertion or until the catheter was removed, whichever came first. Catheter-related infections were diagnosed by quantitative catheter cultures and/or simultaneous quantitative blood cultures. 176 patient catheters were inserted by using maximal sterile barriers as compared to 167 control patients.

At the conclusion of the study there were a total of four catheter infections in the test group and 12 in the control group (P = 0.03, chi-square test). The catheter-related septicemia rate was 6.3 times higher in the control group (P=0.06, Fisher’s exact test). Maximal sterile barrier precautions during the insertion of nontunneled catheters reduce the risk of catheter infection. This practice is cost-effective and is consistent with the practice of universal precautions during an invasive procedure.

3M™ Tegaderm™ Transparent dressing was the "semi permeable tape" used over gauze and was changed every 7 days throughout the study.

"A comparison of transparent adherent and dry sterile gauze dressings for long-term central catheters in patients undergoing bone marrow transplant"

Patients undergoing bone marrow transplant (BMT) are at great risk of infection and sepsis. Long-term central catheters (LTCCs), required for IV therapy, can be a portal of entry for infectious agents. This randomized, prospective study compared two types of catheter dressings in 98 patients undergoing BMT: a dry sterile gauze dressing (DSGD) changed daily and a transparent adherent dressing (TAD) changed every four days. Study outcomes included incidence and severity of local and systemic complications, patient assessment of comfort, and calculation of nursing time. One case of catheter-related infection occurred during the study. No significant differences existed between the two dressings in the incidence of positive skin cultures or local complications with the exception of skin irritation. The TAD caused less skin irritation, was preferred by patients, cost less, and required less nursing time. The findings indicate that TADs provide a safe, comfortable, and cost-effective alternative to DSGDs for patients undergoing BMT and receiving antibiotic support during aplasia.

“Restriction of bacterial growth under commercial catheter dressings”

The effect on the normal cutaneous flora after iodine and alcohol disinfection of the skin of three commercially available moisture-permeable polyurethane dressings was compared with that of a gauze-and-tape dressing. Dressings also were evaluated clinically for membrane adhesion and skin erythema, pruritis, hyperpigmentation, vesiculitis, and tenderness. Each of 50 healthy volunteers and 49 long-term inpatients, 25 of whom were receiving antibiotic therapy, received simultaneously on their volar forearm patches of Op-Site, Tegaderm, Uniflex, and gauze dressings. Controls consisted of one exposed skin site and one covered with moisture-retaining vinylidene film (Saran Wrap). Although after 3 days of adhesion, commercial dressings prevented indigenous flora from returning to normal population densities, no significant quantitative differences were found between them and the gauze-and-tape dressing. Generally, all clinical dressings maintained normal flora at one tenth the population of the uncovered site; the Saran Wrap control supported 100-fold more bacteria than the exposed site. No differences were discovered in the levels of gram-negative bacteria or among-patient groups and between patients and healthy subjects, except for the lower incidence of erythema and itching among patients compared with healthy subjects.

"Comparison of transparent dressing to paper tape dressing over central venous catheter sites"

Two dressing regimens were evaluated in 365 cancer patients with newly inserted central venous catheters. Patients were randomly assigned to one of two treatment groups: (1) transparent dressings (Tegaderm® transparent dressing, 3M, St. Paul, MN) changed once a week (n=188); and (2) paper tape dressings changed three times a week (n=177). Patients were observed for signs of infection, phlebitis, and dressing adherence. The incidence of complications did not differ significantly between groups. Paper tape dressings were worn an average of 2.4 days; transparent dressings were worn significantly longer, an average of 4.0 days. Transparent dressings worn up to seven days were equivalent to paper tape dressing worn for shorter periods with respect to incidence of phlebitis and infections. Proper site care and site inspection can never be eliminated; however, maintenance costs can be reduced, freeing resources for more critical needs.

"Prevention of intravascular catheter-related infections"

The purpose of this article was to review the literature on prevention of intravascular catheter-related infections. Data Sources included MEDLINE database, conference proceedings, and searches for relevant articles in bibliographies of review articles and book chapters. Primary authors were contacted directly if data were incomplete.

Studies met the following criteria unless otherwise stated: Trials were prospective and randomized; catheters were inserted into new sites, not into old sites over guide wires; catheter cultures were done by using semi-quantitative or quantitative methods; and, for prospective studies, catheter-related bloodstream infection was confirmed by microbial growth from percutaneously drawn blood cultures that matched catheter cultures.

The recommended preventive strategies with the strongest supportive evidence included: full barrier precautions during central venous catheter insertion; subcutaneous tunnelling short-term catheters inserted in the internal jugular or femoral veins when catheters are not used for drawing blood; contamination shields for pulmonary artery catheters; povidone-iodine ointment applied to insertion sites of hemodialysis catheters; specialized nursing teams caring for patients with short-term peripheral venous catheters, especially at institutions with a high incidence of catheter-related infection; no routine replacement of central venous catheters.

Bibliography


"A Prospective, Randomized Trial of Gauze and Two Polyurethane Dressings for Site Care of Pulmonary Artery Catheters: Implications for Catheter Management." Makki, DG; Stoiz, SS; Wheeler, S; Mermel, LA. Critical Care Medicine, Vol. 22. No. 11., 1994, pg 1729-1737.

A Comparison of Two Transparent Film-Type Dressings in Central Venous Therapy." Wills JC, van Oondt Albers R, Thewes, APM. Journal of Hospital Infection, Vol.23. 1993, pg 113-121.

Prevention of Central Venous Catheter-Related Infections by Using Maximal Sterile Barrier Precautions During Insertion. Rand II, Hohn DC; Gilbreath BJ; Sniegelman N; Hill LA; Bruso PA; Mants K; Mansfield PE; Boley GB; I Con Hosp Epi., Vol. 15. No. 1, 1994, pg 231-238.


"3M" and "Tegaderm" are trademarks of 3M. Used under license in Canada. Opulse is a trademark of Smith & Nephew Limited. Opulse IV 3000 is a registered trademark of Smith & Nephew Limited. All other trade names referenced are the service marks, trademarks, or registered trademarks of their respective companies.