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## Comparison of Teflon cannulas and metal needles for subcutaneous infusion in terminal care: a pilot study

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Continuous subcutaneous infusion of narcotics and other drugs has been increasingly used in terminal care to control symptoms.<sup>1</sup> Failure of the infusion may be due to failure of the machine or battery, blockage of the tubing or cannula, disconnection, or a local skin reaction. Local skin reactions, such as erythema, swelling, and abscesses, are the principal problem; they may affect drug absorption profiles and necessitate frequent resiting of the cannula.<sup>2</sup> Drugs are commonly administered through a subcutaneous indwelling butterfly needle, but a metal needle may itself cause local reactions. British Standard 4843 states, "Materials used in manufacturing cannulae must not be detrimental to any body tissues."<sup>3</sup> We therefore determined whether the incidence of local skin reactions could be reduced by giving the drugs through Teflon cannulas.

### Patients, methods, and results

We compared Teflon cannulas (Jelco standard wire gauge 22; Critikon, Ascot, Berkshire) and butterfly metal needles (standard wire gauge 23; Abbott, Ireland) under conditions of normal clinical practice. Patients were randomised to have either a butterfly needle or a Teflon cannula inserted under aseptic conditions, and the site of insertion was covered with a transparent dressing (Opsite; Smith and Nephew, Hull). The site was observed daily by nursing staff. When a complication occurred the needle or cannula was removed and the infusion continued through the alternative device. The trial was concluded when the patient had had both a needle and a Teflon cannula removed, although the subcutaneous infusion was continued as required for clinical management.

For each patient we used a standard form to record demographic data; type of cancer; date, time, and site of insertion of the needle and cannula; and reasons for removing the needle and cannula. The dose of drugs infused each day was also recorded. Twenty patients entered the trial, 12 of whom completed it (table).

Eight patients died before either the first or second infusion device had to be removed.

The periods for which the needle and cannula were in place were comparable (Wilcoxon's rank sum test). The incidence of local complications was compared with McNemar's test. Significantly fewer patients experienced swelling when a Teflon cannula was inserted ( $p<0.05$ ), but the incidence of erythema associated with the cannula, although less than that associated with the butterfly needle, was not significantly different ( $p=0.1$ ). The high incidence of mechanical problems with the Teflon cannulas especially kinking and displacement, however, meant that they needed replacing as often as the metal needles, and acute withdrawal symptoms resulted in one patient.

### Comment

A metal cannula under the skin can cause trauma in the underlying tissues, and partly for this reason they are no longer used for continuous intravenous infusion. Ventafridda *et al* suggested that using Teflon cannulas to give drugs subcutaneously may eliminate the problems of skin reactions,<sup>1</sup> but this suggestion has never been examined. We found the mechanical problems with the Teflon cannulas to be the major drawback. Partial withdrawal and hence kinking of the cannula that we used may be due to the design of its hub as it does not have wings for stabilisation. We chose this type of cannula in preference to the more practical winged Teflon cannula because sepsis may occur at the injection port of the winged type.<sup>4</sup>

As Teflon cannulas were associated with fewer skin reactions we suggest that winged Teflon cannulas should be evaluated further: bolus injections at the port should be avoided or a cannula without an injection port could be assessed. This might overcome the mechanical problems while retaining the advantages.

We thank the nursing staff of this hospice and the community and Macmillan nurses in Chesterfield for their cooperation.

1 Ventafridda V, Spoldi E, Caraceni A, *et al*. The importance of continuous subcutaneous morphine administration for cancer pain control. *Pain Clinic* 1986;1:47-55.

2 Dover SB. Syringe driver in terminal care. *Br Med J* 1987;294:553-5.

3 British Standards Institution. *Sterile intravenous cannulae for single use*. London: BSI, 1972. (British standard 4843.)

4 Oberhammer EP. Contamination of injection ports on intravenous cannulae. *Lancet* 1980;ii:1027-8.

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Local complications in 12 patients who received drugs through Teflon cannula and metal butterfly needle

Case No	Teflon cannula			Metal needle		
	Site	No of days in place	Reason for removal	Site	No of days in place	Reason for removal
1	Chest wall	2	Removed accidentally	Abdomen	2	Blocked
2	Chest wall	2	Removed accidentally	Abdomen	2	Blocked
3		2	Cannula kinked and blocked	Upper arm	6	Erythema and swelling
4	Upper arm	12	Erythema and swelling	Chest wall	2	Erythema and swelling
5	Upper arm	2	Cannula kinked and blocked	Upper arm	4	Erythema and swelling; patient complained of soreness
6	Upper arm	4	Erythema, cannula kinked	Upper arm	6	Erythema and swelling
7	Upper arm	6	Cannula kinked	Upper arm	1	Swelling
8	Upper arm	1	Removed accidentally	Upper arm	2	Tube blocked and bleeding at site
9	Upper arm	2	Erythema and swelling	Upper arm	1	Erythema and swelling
10	Upper arm	2	Cannula kinked	Upper arm	4	Erythema and swelling
11	Upper arm	3	Removed accidentally	Upper arm	7	Erythema and swelling
12	Upper arm	7	Cannula kinked	Upper arm	7	Removed accidentally

\* $p<0.05$  for swelling,  $p=0.1$  for erythema, 50% incidence of kinking with Teflon cannulas.