Gloves, extra gloves or special types of gloves for preventing percutaneous exposure injuries in healthcare personnel (Review)


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Gloves, extra gloves or special types of gloves for preventing percutaneous exposure injuries in healthcare personnel

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ABSTRACT

Background

Healthcare workers are at risk of acquiring viral diseases such as hepatitis B, hepatitis C and HIV through exposure to contaminated blood and body fluids at work. Most often infection occurs when a healthcare worker inadvertently punctures the skin of their hand with a sharp implement that has been used in the treatment of an infected patient, thus bringing the patient's blood into contact with their own. Such occurrences are commonly known as percutaneous exposure incidents.

Objectives

To determine the benefits and harms of extra gloves for preventing percutaneous exposure incidents among healthcare workers versus no intervention or alternative interventions.

Search methods

We searched CENTRAL, MEDLINE, EMBASE, NHSEED, Science Citation Index Expanded, CINAHL, NIOSHTIC, CISDOC, PsycINFO and LILACS until 26 June 2013.

Selection criteria

Randomised controlled trials (RCTs) with healthcare workers as the majority of participants, extra gloves or special types of gloves as the intervention, and exposure to blood or bodily fluids as the outcome.

Data collection and analysis

Two authors independently assessed study eligibility and risk of bias, and extracted data. We performed meta-analyses for seven different comparisons.
Main results

We found 34 RCTs that included 6890 person-operations as participating units and reported on 46 intervention-control group comparisons. We grouped interventions as follows: increased layers of standard gloves, gloves manufactured with special protective materials or thicker gloves, and gloves with puncture indicator systems. Indicator gloves show a coloured spot when they are perforated. Participants were surgeons in all studies and they used at least one pair of standard gloves as the control intervention. Twenty-seven studies also included other surgical staff (e.g. nurses). All but one study used perforations in gloves as an indication of exposure. The median control group rate was 18.5 perforations per 100 person-operations. Seven studies reported blood stains on the skin and two studies reported self-reported needlestick injuries. Six studies reported dexterity as visual analogue scale scores for the comparison double versus single gloves, 13 studies reported outer glove perforations. We judged the included studies to have a moderate to high risk of bias.

We found moderate-quality evidence that double gloves compared to single gloves reduce the risk of glove perforation (rate ratio (RR) 0.29, 95% confidence interval (CI) 0.23 to 0.37) and the risk of blood stains on the skin (RR 0.35, 95% CI 0.17 to 0.70). Two studies with a high risk of bias also reported the effect of double compared to single gloves on needlestick injuries (RR 0.58, 95% CI 0.21 to 1.62).

We found low-quality evidence in one small study that the use of three gloves compared to two gloves reduces the risk of perforation further (RR 0.03, 95% CI 0.00 to 0.52). There was similar low-quality evidence that the use of one fabric glove over one normal glove reduces perforations compared to two normal gloves (RR 0.24, 95% CI 0.06 to 0.93). There was moderate-quality evidence that this effect was similar for the use of one special material glove between two normal material gloves. Thicker gloves did not perform better than thinner gloves.

There was moderate to low-quality evidence in two studies that an indicator system does not reduce the total number of perforations during an operation even though it reduces the number of perforations per glove used.

There was moderate-quality evidence that double gloves have a similar number of outer glove perforations as single gloves, indicating that there is no loss of dexterity with double gloves (RR 1.10, 95% CI 0.93 to 1.31).

Authors’ conclusions

There is moderate-quality evidence that double gloving compared to single gloving during surgery reduces perforations and blood stains on the skin, indicating a decrease in percutaneous exposure incidents. There is low-quality evidence that triple gloving and the use of special gloves can further reduce the risk of glove perforations compared to double gloving with normal material gloves. The preventive effect of double gloves on percutaneous exposure incidents in surgery does not need further research. Further studies are needed to evaluate the effectiveness and cost-effectiveness of special material gloves and triple gloves, and of gloves in other occupational groups.

Plain Language Summary

Extra gloves or special types of gloves for preventing sharps injuries in healthcare workers

Background

Healthcare workers can hurt themselves accidentally with needles or sharp instruments that have been used in patient care. This carries a small risk that the healthcare worker becomes infected with a viral disease such as hepatitis or HIV. Therefore it is important to prevent blood contact to prevent infection. We evaluated whether the use of gloves, more than one layer of gloves or special gloves can prevent needles or sharp instruments from piercing the skin. Up until June 2013, we found 34 studies that evaluated 6890 operations. There were no studies in non-surgical staff.

Two pairs of gloves compared to one pair only

In 12 studies, two pairs of gloves reduced the number of perforations in gloves by 71% compared to the use of one pair of gloves. In three studies, two pairs of gloves reduced blood stains on the skin by 65%. The reduction in self-reported needlestick injuries was less clear.

Three pairs of gloves compared to two pairs of ordinary gloves

One low-quality study showed that triple gloves compared to double gloves can further reduce perforations.
**A pair of thicker or special gloves compared to a pair of ordinary gloves**

Five low-quality studies showed that the number of perforations was similar for thicker and thinner gloves. In two low-quality studies, the use of one pair of fabric gloves over one pair of normal gloves reduced perforations compared to two pairs of normal gloves. This was similar for gloves made from special material such as fabric or steel, used in between normal gloves.

**Indicator gloves**

Indicator gloves show a coloured spot when they are pierced. Two studies showed that they reduced the number of perforations per glove but not the total amount of perforations.

**Sensitivity of the fingers**

There were no indications that using more layers of gloves decreased sensitivity of the fingers.

**Conclusions**

Surgeons and surgical staff can reduce their risk of contracting a serious viral infection by wearing two pairs of gloves instead of one pair of gloves. The use of three glove layers or gloves made from special material probably reduces the risk further but these need better evaluation. We need further studies to evaluate whether gloves have a similar preventive effect in other healthcare professionals outside the operating theatre.