MASQUES CHIRURGICAUX JETABLES : UNE ÉTUDE SYSTÉMATIQUE

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Remerciements : *Cochrane Collaboration Wounds Group* et le *Theatre Nursing Trust Fund*. Extraits de l'étude systématique reproduits avec la permission de : Update Software, Oxford

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RÉSUME

Le but original du développement des masques chirurgicaux était de contenir et de filtrer les gouttelettes contenant des microorganismes expirées de la bouche et du nasopharynx des travailleurs de la santé en salle d'opération afin de fournir une protection au patient. Toutefois, il y a plusieurs façons dont les masques chirurgicaux auraient le potentiel de contribuer à la contamination de la plaie opératoire. Récemment les masques chirurgicaux ont été recommandés comme barrière entre l'équipe chirurgicale et le patient; cependant, l'efficacité du masque chirurgical en tant que moyen de prévention de l'infection des plaies opératoires est sujette à caution.

L'objectif de l'étude systématique est d'identifier et d'analyser tous les essais comparatifs randomisés évaluant l'utilisation de masques chirurgicaux par l'équipe chirurgicale lors de chirurgie propre dans le but de prévenir l'infection postopératoire de la plaie opératoire.

Toutes les publications traitant des masques chirurgicaux jetables sont grâce au *Specialised Trials Register* (registre des essais spécialisés) du *Cochrane Wounds Group* (mars 2001). Les fabricants et distributeurs de masques chirurgicaux jetables ainsi que les organismes professionnels, y compris la *National Association of Theatre Nurses* et l'*Association of periOperative Registered Nurses,* ont été consultés pour les détails sur les études en cours et non publiées.

Inclus sont les essais comparatifs randomisés et quasi-randomisés comparant l'utilisation de masques chirurgicaux jetables et la non utilisation de ceux-ci.

Résultats primaires : Deux essais comparatifs randomisés impliquant un total de 1 453 patients sont inclus. En ce qui concerne le plus petit essai, la tendance démontrée indique une association entre l'utilisation des masques et un nombre réduit d'infections. Cependant, dans un plus grand essai, il n'y avait aucune différence entre le taux d'infection entre le groupe masqué et le groupe non masqué. L'analyse de ni un ni l'autre des essais ne prend en compte la randomisation des groupes.

Conclusion des auteurs : Selon les résultats limités, il n'est pas clair si l'utilisation des masques chirurgicaux constitue un avantage ou un désavantage au patient subissant une chirurgie propre.

Disposable Surgical Face Masks: A Systematic Review

DISPOSABLE SURGICAL FACE MASKS: A SYSTEMATIC REVIEW

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Acknowledgements: Cochrane Collaboration Wounds Group and the Theatre Nursing Trust Fund. Extracts of systematic review reproduced by kind permission of: Update Software, Oxford.

ABSTRACT

Surgical face masks were originally developed to contain and filter droplets of microorganisms expelled from the mouth and nasopharynx of healthcare workers during surgery, thereby providing protection for the patient. However, there are several ways in which surgical face masks could potentially contribute to contamination of the surgical wound. Surgical face masks have recently been advocated as a protective barrier between the surgical team and the patient, but the role of the surgical face mask as an effective measure in preventing surgical wound infections is questionable.

The aim of the systematic review is to identify and review all randomised controlled trials evaluating disposable surgical face masks worn by the surgical team during clean surgery to prevent postoperative surgical wound infection.

All relevant publications about disposable surgical face masks were sought through the Specialised Trials Register of the Cochrane Wounds Group (March 2001). Manufacturers and distributors of disposable surgical masks as well as professional organisations including the National Association of Theatre Nurses and the Association of Operating Room Nurses were contacted for details of unpublished and ongoing studies.

Randomised controlled trials (RCTs) and quasi-randomised controlled trials comparing the use of disposable surgical masks with the use of no mask were included.

Main results: Two randomised controlled trials were included involving a total of 1,453 patients. In a small trial there was a trend towards masks being associated with fewer infections, whereas in a large trial there was no difference in infection rates between the masked and unmasked group. Neither trial accounted for cluster randomisation in the analysis.

Reviewers' conclusions: From the limited results it is unclear whether wearing surgical face masks results in any harm or benefit to the patient undergoing clean surgery.

INTRODUCTION

Systematic reviews are considered to be the most credible form of evidence from which to inform practice. Dissemination of the results of systematic reviews is vital in order to influence clinicians to ensure that their practice is evidence based.

Both authors have a background in the operating department environment and were afforded the opportunity to undertake a systematic review with the Cochrane Collaboration (Wounds Group) as a result of funding from the Theatre Nursing Trust Fund. The actual process of undertaking a systematic review is outside the scope of this paper and has been explored elsewhere (Edwards & Lipp 2001).

This paper is based upon the systematic review of the use of disposable surgical face masks (Lipp & Edwards 2002).

AIMS OF THE SYSTEMATIC REVIEW

To identify and review all relevant data in order to determine whether disposable surgical face masks worn by the surgical team prevent surgical wound infection in clean surgery.

BACKGROUND

Surgical face masks were originally developed to contain and filter droplets of micro-organisms expelled from the mouth and nasopharynx

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Disposable Masks (cont.)

during surgery. They were introduced around a century ago as a method of protecting patients from the risk of surgical wound infections (Belkin 1997).

The primary purpose of a surgical mask is to provide protection for the patient from the surgical team. Recently, masks have been advocated as a protective barrier for the surgical team from the patient (Garner 1996, Weber et al 1993). This systematic review will not investigate the use of surgical masks for this purpose. The surgical face mask is disposable and generally made up of three or four layers. It is normally designed with two filters that act as a barrier down to 1 micron, therefore trapping bacteria of that size or larger. The protection afforded by this type of mask is claimed to be a minimum of four hours (UHS 2000). Worn correctly, the mask should cover the nose, with the metal band contouring the bridge of the nose. The mask should be drawn underneath the mouth and secured by tying the tapes firmly around the back of the head.

Although the surgical mask is designed to protect the patient there are several ways in which it could contribute to contamination of the surgical wound. Firstly insufficient tension on the strings causes 'venting'. Venting is leakage of air from the side of the mask. The exhaling of moist air increases resistance, which is thought to exacerbate the problem of venting (Belkin 1996).

Secondly, Belkin (1996) also cites 'wicking' as a method of conveying liquid via capillary action as possibly contributing to the passage of bacteria. Thirdly a mask could cause contamination by 'wiggling'. This is a term used to describe friction of the mask against the face which has been shown to cause the dispersal of skin scales from the face, resulting in possible contamination of surgical wounds (Schweizer 1976).

In addition, the mask may be worn incorrectly; for example, allowing exposure of the nose or mouth. Removal of the mask by grasping the filter section could result in contamination of the wearer's hands, whereas disposal is recommended by handling the tapes only (Perry 1994).

These issues call into question the effectiveness of the design and highlight the incorrect use of surgical face masks. As with many interventions surgical face masks were introduced without standard specifications or formal evaluation. Despite acknowledging the controversy surrounding the use of masks, they are currently recommended by numerous operating department organisations (AORN 1998, NATN 1998).

This uncertainty has lead to inconsistent practices based on inadequate rationale. For example, the use of surgical face masks has been abandoned by some surgical teams (in part or whole) and during certain procedures. In choosing to not wear a mask members of the surgical team could be leaving the patient vulnerable to the risk of wound infection via droplet contamination.

A clean surgical wound is classified as 'an uninfected operative wound in which no inflammation is encountered and the respiratory, alimentary, genital or uninfected urinary tract is not entered' (Mangram et al 1999). Non-clean wounds may be classified as clean-contaminated, contaminated or dirty-infected depending upon the area of the body operated upon and the level of infection and inflammation present. A surgical wound is less likely to become infected postoperatively if it is classified as clean, therefore any infection arising could be more reasonably attributed to other factors such as the use of a surgical face mask (Mangram et al 1999).

Diagnosis of a surgical wound infection is not without its challenges. For example, some patients such as the elderly and the immuno-compromised do not always display the cardinal signs of infection. However, correct diagnosis of surgical wound infections is imperative to ensure accurate surveillance. A surgical wound infection is defined by 'pus, or a swab with >106 cfu per mm3 tissue and at least one of the following signs or symptoms: pain, localised swelling, redness or heat' (Mangram et al 1999).

The costs incurred when a patient contracts a surgical wound infection are considerable in financial as well as social terms. It has been estimated by Plowman et al (2000) that each patient with a surgical wound infection requires an additional hospital stay of 6.5 days and that hospital costs are doubled. When extrapolated to all acute hospitals in England it was estimated that the annual cost nationally was almost #1 billion. It is not currently known what proportion of this figure could be attributed to the use or non-use of disposable surgical face masks.

The above discussion indicates that the role of the surgical mask as an effective measure in preventing surgical wound infections is questionable and this together with the cost implications warrants a systematic review.

LITERATURE SEARCH

The gold standard for the inclusion into systematic reviews of effectiveness is the randomised controlled trial (Oxman & Clarke 1999). In this review only quasi-randomised controlled trials were retrieved.

The literature search was conducted to include both scrubbed and non-scrubbed members of the operating team. The intention of the review was to examine the use versus non-use of disposable surgical face masks in both adult and paediatric clean surgery. It was not the intention to explore visors, non-disposable masks or other personal protection properties of the face mask.

Cochrane Collaboration has a well-established search strategy for the literature search.

Studies to be considered for the review were sought from The Cochrane Controlled Trials register (CCTR) which contains the Cochrane Wounds Group Specialised Trials Register (see Table 1).

The Cochrane Wounds Group Trials Register has been compiled through searching of the major health databases including MEDLINE, Cinahl and EMBASE and is regularly updated through searching of the Cochrane Controlled Trials Register, handsearching of wound care journals and relevant conference proceedings (Collaborative review group search strategy, Cullum et al 2001).

The bibliographies of all retrieved and relevant publications identified by these strategies were searched for further studies. There was no specific date restriction placed upon study inclusion, but only disposable surgical face masks were considered. Manufacturers and distributors of disposable surgical masks as well as professional organisations including the National Association of Theatre Nurses, the European Operating Room Nurses Association, the Australian College of Operating Room Nurses and the Association of Operating Room Nurses were contacted for details of unpublished and ongoing studies. There was no restriction on the inclusion of reports based on language of publication, or publication status.

TABLE 1

The Cochrane Wounds Group Specialised Trials Register database was searched on CD ROM 2001 Issue 1 using this strategy:

1	(MASK or MASKS)
2	(FACE AND MASK)
3	MASKS*:ME
4	((#1 or #2) or #3)
5	(SURGICAL and INFECTION)
6	SURGICAL WOUND INFECTION*:ME
7	WOUND INFECTION*:ME
8	ANTISEPSIS*:ME
9	(((#5 or #6) or #7) or #8)
10	PERIOPERATIVE CARE*ME
11	INTRAOPERATIVE CARE*ME
12	(#9 or #10 or #11)
13	(#4 and #12)

METHODS

Titles and abstracts of references identified by the search strategy were assessed in terms of their relevance and design according to the selection criteria. The two reviewers performed this independently. Copies of those articles and studies that appeared to satisfy these criteria were obtained. When it was unclear from the title or abstract if the paper fulfilled the criteria, or when there was disparity between the reviewers, a copy was obtained. The two reviewers then jointly decided whether to include or exclude a study.A piloted data extraction sheet was used to extract and summarise details of the studies (see Table 2). When data were missing from the study an attempt was made to contact the authors to

Continued on Page 33

CONFÉRENCE NATIONALE (cont.)

C'est fabuleux. Voici un petit aperçu du nombre des délégués par province :

Territoires Nord-Ouest :	5
Colombie Britannique :	104
Alberta :	84
Saskatchewan :	39
Manitoba :	50
Ontario :	269
Québec :	286
Nouveau-Brunswick :	34
Île du Prince Édouard :	6
Nouvelle-Écosse :	58
Terre Neuve, Labrador :	20

Autres visiteurs :

NSW Australie :	6
États-Unis :	4
Angleterre :	2
Bermudes :	2

Photo by/par Interzone Photography

Marcy McKay - president ORNAC, at Closing Ceremonies / présidente de l'AIISOC aux cérémonies de clôture

un vidéo nous donnant un bref aperçu des différentes activités de la semaine. C'était un moment unique. On avait l'impression de revivre avec plaisir chacun de ces instants tout en éprouvant une petite pointe de nostalgie. Mais pour peu de temps, car le tout s'est terminée sur une note très dynamique de notre conférencière sur la gestion du stress par l'humour. Finalement, ce fut la fermeture officielle par le retrait et le défilement des drapeaux de chaque province.

Pour terminer, la cérémonie de clôture était à la fois simple et émouvante. Les deux présidentes de la prochaine conférence nationale, Marcy McKay et Sandy Stewart, nous ont fait découvrir quelques charmes de Victoria, cette belle ville toute en fleurs. Par la suite, nous avons visionné

Félicitations et merci à tous les membres du comité organisateur pour la réalisation de ce beau projet. Si cette conférence a été couronnée d'un tel succès, c'est grace à votre ardeur, votre passion et votre formidable esprit d'équipe. Merci également à nos délégués ainsi qu'aux représentants des produits médicaux pour votre extraordinaire support.

Photo by/par Interzone Photography

Award Recipients L to R / Récipiendaires des prix, g à d: Alicia Oucharek Mattheis (Awards Chair/Présidente du comité des prix), Monique Perazelli (Gagnante de la bourse J&J Bursary Winner), Karen Frenette (Gagnante de la bourse J&J bursary winner), Anne Sigouin (J&J Medical Products), Joan Porteous (Gagnante du prix de rédaction Drake Thompson Writing Award winner), and/et Jackee Higgins (Gagnante du prix de rédaction Drake Thompson Writing Award winner)

Photo by/par Interzone Photography

Karen Frenette (Research Committee Chair/Présidente du comité de recherche) with/avec Sue Beaman (Récipiendaire de la subvention de recherche Cardinal Health Research Grant recipient) and/et Vafa Jamali (Cardinal Health).

Disposable Masks (cont. from page 25)

obtain missing information. Data extraction was undertaken independently by the two reviewers and compared. Differences of opinion related to study inclusion, methodological quality and data extraction was resolved by discussion with a third party. Studies were excluded if they were not randomised, or if they were controlled clinical trials of disposable surgical face masks (Lipp & Edwards 2002). The validity of the studies was assessed to detect potential sources of bias from the study design (see Table 3).

Results of literature search

The initial search yielded 250 citations; the abstracts of these papers were examined to assess potential relevance. We subsequently retrieved 97 papers for fuller examination. Of these, 11 were excluded from the review due to study design, or differing outcome measures and two were included. No unpublished studies were identified which met the criteria for inclusion. There was no response to requests for further information from the authors of included studies. No studies were published in duplicate. Thirteen trials were identified and two randomised controlled trials met the inclusion criteria. This review took at face value any description in the original studies of the type and cleanliness category of surgery performed. As a result studies performed in the operating department were included and other areas such as the laboratory, maternity ward and accident and emergency were excluded.Tunevall (1991) set up a random list for one year at a time denoting weeks as masked or unmasked. The study included all types of surgery clean, clean contaminated and contaminated. Only data relating to clean surgery were extracted.

Chamberlain (1984) involved gynaecological operation lists carried out by masked and unmasked staff. This study was abandoned after 41 patients, due to the identification of wound infections in three out of the five major clean cases performed. The bacteria identified in the infected wounds were not linked in any way to the bacteria identified with the operating department personnel.

Randomisation and concealment of allocation

In Tunevall (1991) the method of randomisation used was not explained. A randomisation list denoting masked or unmasked weeks was drawn up for one year, but it is not clear how the randomisation list was prepared. A week, rather than an operating list or single operation was chosen to ensure a similar number of major and minor cases as most major cases were performed at the beginning of the week. The randomisation list was inversed for the second and part of the third year due to anticipated seasonal differences, therefore not concealing allocation and enabling members of the theatre team to calculate whether the week was likely to be masked or unmasked. It is not clear whether the members of the admitting personnel had access to the randomisation list.

Chamberlain (1984) stated that the operating lists of one surgical team were randomly allocated to a masked or unmasked group over two months. Later Chamberlain (1984) indicated that masked and unmasked staff carried out the gynaecological operation lists alternately. The time between allocation of each list as masked or unmasked and the start of the list is not stated making allocation concealment uncertain.

In both studies the surgical team is used as the unit of randomisation and the patient is used as the unit of assessment thus creating a unit of analysis error.

There is no information in either study as to how patients were allocated to particular operating lists and so selection bias, by the person compiling the operating list, cannot be excluded during this phase of the study. Selection of patients to the different intervention groups was controlled by the authors of both studies, but the methods appear to fall short of genuine randomisation. Therefore the included studies are classed as quasi-randomised.

Number of patients

A power calculation informed Tunevall (1991) that the study would have to include over 3,000 patients to demonstrate a decrease of 30% in wound infection rate. It is unclear whether the power calculation was performed on the basis of cluster randomisation, or individual randomisation. Although the study involved a total of 3,088 patients only 1,429 patients undergoing clean surgery met the criteria of this

TABLE 2

The following data were extracted from each study:

- Trial setting
- Number of air filtration changes in the surgical field per hour
- Filtering capacity/specification of masks
- Types of surgery
- Number of wound infections
- Definition of wound infection
- Depth of wound infection
- Documentation of co-interventions
  * use of prophylactic antibiotics
  * use of antiseptic irrigation
- **After piloting, data also included:**
  * Identified bacteria associated with staff and patients
  * Measurement of compliance in the wearing of surgical face masks (ie: mask covered nose and mouth, presence of wicking and venting)
  * The size of the surgical team

review. In Chamberlain (1984) only 41 patients were recruited because the study was discontinued. Out of this number only 24 cases were clean surgery. With such a small number of female patients, it is unlikely that they were representative of the population.

Similarity at baseline

A description of the baseline characteristics of the patients is important to decide whether the results are generalisable and to compare characteristics of the two groups to ensure that the randomisation was successful. Tunevall (1991) confirmed baseline comparability for age and types of surgery. In Chamberlain (1984) due to the nature of gynaecological surgery all patients were female and no baseline comparability was reported.

Outcome measures

The outcome measure used in Tunevall (1991) trial was wound infection defined as pus, visible to the naked eye, or cellulitis without pus, both requiring debridement or percutaneous drainage and/or antibiotic therapy. With this study follow up was until after discharge, but it was not explicit how these patients were followed up once discharged. Chamberlain (1984) did not define wound infection, but two out of the three wound infections reported were noted as serious enough to warrant antibiotics. The other infection being identified by a high vaginal swab. All patients in this study were examined daily until discharge.

Neither study took any steps to measure compliance in relation to the correct wearing of surgical face masks, or recording any events such as venting, wicking or wiggling.

No other primary or secondary outcome measures listed in this review were considered by either study.

Data analysis

Neither study was analysed on an intention to treat basis. Chamberlain (1984) study was discontinued after seven weeks after a third case of postoperative infection in the unmasked group was diagnosed. However, the authors acknowledge that although two of three wounds grew staphylococcus aureus, in neither case was it a strain which corresponded to those isolated from the staff. Similarly in the Tunevall (1991) study no dropouts were reported.

TABLE 3

Validity assessment criteria of studies:

- Method of randomisation
  * generation of the randomisation schedule
  * method of randomisation eg: envelopes, computer etc.
- Baseline comparability of treatment and control groups
- Length of follow up
- Inclusion criteria
- Exclusion criteria
- A sample sufficiently large to detect clinically important differences as statistically significant
- Blinding of patients (recipients)
- Blinding of outcome assessors to wearing of masks
- Extent of loss to follow-up and use of intention to treat analysis
- Source of funding

Blinding of participants

It was impossible to blind the participants (surgical team) of the trials to wearing or omitting a surgical face mask. The blinding of patients was not stated in either study. Neither study distinguished between the use of local anaesthetic and general anaesthetic. Blinding of outcome assessors was in place for Chamberlain (1984) with the member of laboratory staff being unaware of the group allocation of the specimens obtained. Whereas with Tunevall (1991) specific notification of the trial was given with each wound swab submitted for culture therefore allowing the potential for detection bias.

Both studies included all members of the surgical team and neither study examined whether particular members of the team were more or less likely to cause a surgical wound infection.

Consent

Neither author specified whether consent was obtained from the staff involved in the study. Tunevall (1991) stated that consent was obtained from patients, but Chamberlain (1984) did not specify that consent from patients had been obtained.

RESULTS OF REVIEW

Both studies compared the use of disposable surgical face masks with using no surgical face masks. A total of 1,453 patients were included. Clinical and methodological homogeneity was assessed. The observed clinical heterogeneity between the trials was reflected in parameters such as study population, time lapse of seven years influencing technique and equipment, diagnosis and length of follow up. Potential sources of clinical heterogeneity could be attributed to type of disposable surgical face mask, of operating theatre design for example airflow rates and country of study. Given this clinical heterogeneity it was inappropriate to pool

the two studies. Statistical heterogeneity depends on both clinical and methodological differences within the trials. Methodologically there were differences between the baseline comparability of the two trials Chamberlain's 1984 study was restricted to gynaecological surgery thus including women only. The study was also discontinued before any comparability could be established. Whereas Tunevall (1991) reported that the groups were similar for age and acute and cold surgery. Also Tunevall (1991) used a considered sample whereas Chamberlain (1984) only had a sample of 41 which compromises the methodological quality. Interpreting the sources of heterogeneity was undertaken mindful that it was post hoc.

The Tunevall (1991) study reported 13/706 infections in the masked group and 10/723 infection in the non masked group, this did not demonstrate any significant difference in infection rates (OR 1.34, 95% CI 0.58 to 3.07). Chamberlain's 1984 small study reported no infection in the masked group and 3/10 infections in the non masked group but the results were non significant (OR 0.07, 95% CI 0.00 to 1.63). The main outcome measure of postoperative surgical wound infection was stated by both studies. Neither study author considered the secondary outcome measures listed in the review of costs of infections, length of hospital stay and mortality rate.

Potential bias in the primary studies and the limitations placed on inferences

Of the two studies that met the inclusion criteria studies of this review it was found that the overall strength of evidence provided was weak. Both studies were randomised but the allocation concealment was unclear, possibly due to the fact that both studies were published prior to the CONSORT guidelines (Begg et al 1996). Methodologically the studies results may have been biased in several ways. Chamberlain (1984) did not specify the criteria used to detect the presence of a wound infection. Mangram et al (1999) report that failure to use objective criteria to define surgical site infection has been shown to substantially affect reported surgical site infection rates. Chamberlain (1984) was limited by its discontinuation after seven weeks as result of several infections, thus creating a potential bias in the findings towards the use of surgical face masks.

Follow-up by Chamberlain (1984) was until after discharge and by Tunevall (1991) until discharge. However, the actual duration of follow-up could have varied considerably depending upon the type of surgery performed with the potential of underestimating the number of surgical wound infections present. It is likely that the inadequate concealment of allocation and lack of blinding in both studies resulted in under- or over-estimation of the effects of wearing a surgical face mask.

The types of disposable surgical face mask used in the study were specified by Tunevall (1991), but not by Chamberlain (1984). It is possible that the specific mask composition changed between the time of the two studies and this has the potential to influence results.

Potential bias in the review and the limitations placed on inferences

The reviewers relied on the good will of experts in the field to provide information on completed or ongoing, published or unpublished studies. When critically appraising the validity of the studies the reviewers had to rely on adequate reporting of the trials. By assuming that if something was not reported it was not done, is not necessarily correct. The reviewers did attempt to obtain additional clarifying data from investigators. However, no response was received. The examination of the effectiveness of disposable surgical face masks must be seen in the context of the number of variables associated with wound infections. The data extraction sheet attempted to collate confounding variables such as environmental issues, but no data were provided in the trial reports. It is difficult to interpret from smaller studies such as Chamberlain 1984 whether surgical face masks are a significant contributing factor to surgical wound infections.

Applicability of results

The results extracted for this review were limited to clean surgery and therefore the results cannot be extrapolated to other categories of surgery. The contribution that disposable surgical face masks make towards preventing infection is likely to be less consequential in contaminated wounds than in clean surgery. Although the review did not exclude trials involving prostheses, no trials of this nature were found, therefore limiting application of the review's results to this type of surgery. Neither study differentiated between the scrubbed and non-scrubbed members of the team in their results. Therefore it is not possible to discriminate between the contribution of the various members of the surgical team to any resulting surgical wound infection. The two studies included were based in the operating department and so application of the results to other invasive procedures in other clinical areas is limited.

The potential of surgical face masks to benefit the patient via reducing surgical wound infections or harm the patient by increasing surgical wound infections was examined in this review. Analysis was not undertaken of the potential to harm or benefit the surgical team by way of protection. Although Chamberlain's 1984 results favoured the use of surgical face masks it was relatively small and was discontinued on spurious grounds. The Tunevall (1991) trial was larger, more rigorously designed and its results favoured not wearing a surgical face mask, although these were not statistically significant.

Discussion

Given the prevalence of the use of surgical face masks, research into this topic remains surprisingly neglected. It was disappointing that only two trials met the inclusion criteria of this review and these were undertaken prior to 1991.

Much of current national and international policy is based upon equivocal evidence from two main sources, neither of which met the inclusion criteria for this review. The first group of experimental studies involved testing the filtration efficiency of surgical face masks in the laboratory. The second group of studies was concerned with measurement of potential contamination of the surgical field using settle plates (Edwards 2001).

Disposable Masks (cont.)

No other reviews in this area were found and the limited number of trials in this review make it unsafe to draw definitive conclusions about the effect of surgical face masks on reducing surgical wound infection in clean surgery.

From the limited results it is unclear whether wearing surgical face masks causes any harm or benefit to the patient undergoing clean surgery. The authors firmly believe that further robust research is needed to determine conclusively the benefit of surgical face masks as a patient protective device (Lipp & Edwards 2002).

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