Infection control in day-care centres in Greenland

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ABSTRACT

Objectives. The aim of this study was to determine hygienic habits and precautions taken with main focus on hand hygiene, cleaning and laundry in day-care centres in Greenland. Methods. In the period 2000-2002 we investigated 33 day-care centres in towns along the west coast of Greenland using a questionnaire. The majority of the day-care centres (18/33) were found in the biggest towns in Greenland Nuuk and Sisimiut. Results. The institutions covered 34% of children attending day-care centres in Greenland. Although most caregivers and children would wash their hands before meals and after changing diaper/toilet, not all did so. One third of caretakers did not wash hands after wiping a child’s nose. Paper towels were only available as recommended in 25% of day-care centres. Linen was washed weekly or more often per month, but at lower temperatures than recommended. Most floors were washed daily. Conclusions. The day-care centres in general did not follow hygienic recommendations sufficiently, and the hygienic behaviours resembled more those of home. For public institutions this is not sufficient to prevent cross-contamination, as the risk of spread of microorganisms is high in institutions with many contacts. Caregivers are the most important role models in teaching the child good hygienic habits such as hand hygiene. Hygienic education of caregivers and early hygienic training of children, preferably already in nursery, is therefore important and should be strengthened.

Keywords: Hand hygiene, children, day-care centres, Greenland, infections.

INTRODUCTION

One of the major health challenges in modern life of children aged 0-6 years is the use of day-care centres. Numerous studies throughout the world have described an increased risk of infectious diseases associated with attending day-care centres. In Denmark in 1990 Ulldal found that the risk of diseases in children attending day-care centres was increased 2-7 times compared with children in home-care (1). In Greenland the rates of upper and lower respiratory tract infections are among the highest in the world and the infections are responsible for much morbidity in this population (2). In a cohort study from 1996-98 among children aged 0-2 years, attending day-care centres was a strong risk factor for respiratory tract infections, and the population-attributable risk percent associated with attending day-care centres was approximately 50%, meaning that in theory 50% of infections could have been avoided had the children been taken care of in their homes (3).

These infections do not only have consequences for the children themselves, but also for the parents and society in the form of e.g. parental absence from work and related costs, and an increased consumption of antibiotics with risk of development of antibiotic resistance. The infections may also spread to members of the household and to the community. Therefore in-
Infections achieved in public institutions like day-care centres and hospitals, known as nosocomial infections, have over the past years drawn much attention from especially politicians and administrators of public institutions.

The main mechanisms behind infections in day-care centres are the increased susceptibility to infectious agents in children below two years of age and the close contacts between the children caused by the aggregation of children in a limited space (crowding), favouring the transmission of infectious agents. Infectious diseases in day-care centres often occur in epidemics. Respiratory tract and enteric pathogens are responsible for most illnesses. The agents are transmitted by hand (indirect contact), primarily hand-to-mouth or fecal-orally, but other indirect contacts through toys and surfaces are known to be ways of cross-contamination. Airborne transmission in the form of droplets is of less importance - but when drops and aerosols contaminate toys and surfaces, they are part of indirect cross-contamination via hands. Especially among younger children the hand-to-mouth route is evident because infants chew on the toys.

The health and social authorities in Greenland have issued guidelines for hygiene in day-care centres in Greenland. It is, however, unknown to what extent hygienic precautions are known and met in Greenlandic day-care centres. We therefore carried out a questionnaire-based study of hygienic knowledge and precautions taken in a number of Greenlandic day-care centres with the long-term aim of reducing direct and indirect transmission of infectious agents.

METHODS
In year 2000 4,134 children (59% of all children aged 0-6 years) in Greenland attended day-care centres. In the period 2000-2002 33 day-care centres in larger towns along the west coast of Greenland were chosen. These institutions covered nurseries, kindergartens, and integrated institutions with both nursery and kindergarten. Eighteen of the day-care centres (55%) were from Nuuk and Sisimiut, the two largest towns of Greenland, comprising approximately 34% of the population of Greenland.

A questionnaire on physical conditions of the institution and hygienic measures and habits was constructed and sent to the directors of the institutions. Eight institutions filled out the questionnaire, but the remaining 25 did not do so and were interviewed using the questionnaire.

RESULTS
In total 1,423 children aged 0-6 years attended the institutions, approximately 34% of the children in Greenland attending day-care centres. Twenty-seven of the 33 institutions (82%) were built for the purpose, and 50% were built before 1980, the rest were built after that. The average size of each institution was 355 m² (range 111-793 m²), with an average of 4.9 rooms (range 1-13 rooms). Average space per child was 8 m² (range 3.3 – 17 m²). However, only nine of the institutions (27%) could answer the question of square meters. With this in mind the institutions seem to fulfil the recommendations of the Chief Medical Officer in Greenland of at least 3 m² for infants and 2 m² for toddlers.

Table I shows the results concerning hand-washing procedures for caregivers as well as children. It is seen that most caregivers and children wash their hands always or most often before meals. Most caregivers, but not all, wash their hands after clean procedures, and only 40% of children do so after potty. Approximately 1/3 of caregivers wash their hands rarely or never after wiping a child’s nose. Most institutions used cotton towels. Table II shows the results concerning cleaning and laundry habits. Almost all institutions washed linen, mattress and pillow covers weekly or more often per month, but only 20% at 80ºC or more, and only 31% changed the cloth on baby changing table after each child. Most institutions cleaned their floors daily, while in 12% potties were cleaned once a day or less often.

There were written guidelines for hand hygiene in 24% of the institutions, in 70% for cleaning, in 33% for laundry, in 85% for precautions after
absence, and in 73% for sending children home due to illness.

Figure 1 shows the distribution of time spent outdoors. It is seen that there is strong seasonal variation, but even in winter, in more than 50% of day-care centres between 45 and 90 minutes are spent outdoors each day.

**DISCUSSION**

An essential tool for prevention of infections in day-care centres is sufficient hand hygiene. Not only does good hand hygiene decrease absence rates for children, but also for their caretakers. The effect of intervention has in various studies been found to range from a few percent to 50%, nationally as well as internationally (4).

Hand hygiene is to be performed before all clean and after all contaminated procedures. We found that this was not the case, either for the caregivers or the children. However, hand hygiene is a skill you learn from watching others and by being taught. Caregivers are the most important role models in this process and as we found that 60% both of caregivers and children washed their hands before meals, this indicates that the children learn from the caregivers. Enforced education of caregivers on hand hygiene is therefore essential.

Children would wash their hands after potty and toilet at the same rates, 38% and 40%, respectively. This indicates that children who wash their hands after potty continue with this good habit when growing up. Therefore hygiene education should start already in nursery.

Taking into account indirect transmission of respiratory agents, it was particularly worrying that only 18% of caregivers

### Table 1. Hand hygiene procedures in 33 day-care centres in Greenland.

| Procedure                                      | Caregivers | Children |
|------------------------------------------------|------------|----------|
| Hand washing before meals                      | n (%)      | n (%)    |
| Always                                         | 20 (61)    | 20 (61)  |
| Most often                                     | 8 (24)     | 8 (24)   |
| Rarely                                         | 2 (6)      | 4 (12)   |
| Never                                          | 1 (3)      | 1 (3)    |
| Don’t know                                     | 2 (6)      | 0 (0)    |
| Hand wash after contaminated procedures         |            |          |
| After changing contaminated diaper              |            |          |
| Always                                         | 19 (73)    | 9 (38)   |
| Most often                                     | 6 (23)     | 2 (8)    |
| Rarely                                         | 1 (4)      | 7 (29)   |
| Never                                          | 0 (0)      | 3 (13)   |
| Don’t know                                     | 0 (0)      | 3 (13)   |
| After changing wet diaper                      |            |          |
| Always                                         | 16 (59)    | 13 (41)  |
| Most often                                     | 7 (26)     | 13 (41)  |
| Rarely                                         | 3 (11)     | 4 (13)   |
| Never                                          | 1 (4)      | 1 (3)    |
| Don’t know                                     | 0 (0)      | 1 (3)    |
| After wiping a child’s nose                     |            |          |
| Always                                         | 6 (18)     |          |
| Most often                                     | 11 (33)    |          |
| Rarely                                         | 10 (30)    |          |
| Never                                          | 2 (6)      |          |
| Don’t know                                     | 4 (12)     |          |
| Type of soap available                         |            |          |
| Soap on magnet                                 | 4 (12)     | 27 (84)  |
| Soap in a dish                                 | 10 (30)    | 1 (3)    |
| Liquid soap                                    | 19 (58)    | 3 (9)    |
| Don’t know                                     | 0 (0)      | 1 (3)    |
| Type of towel available                        |            |          |
| Cotton towel for each person                   | 13 (41)    | 27 (84)  |
| Common cotton towels                           | 8 (25)     | 1 (3)    |
| Cotton towels that are washed after each use   | 3 (9)      | 3 (9)    |
| Paper towels                                   | 8 (25)     | 1 (3)    |
| Disinfectants ever used instead of washing hands|          |          |
| Yes                                            | 1 (3)      |          |
| No                                             | 32 (97)    |          |
would wash their hands after wiping a child’s nose.

Good hand hygiene is performed with either liquid soap or soap on a magnet and with paper towels. We found that just around half of the day-care centres followed these recommendations. Only 1 of 33 day-care centres used hand disinfection as an alternative to washing hands. Hand disinfection has some advantages compared to washing hands with water and soap, as it is easier to use, more gentle to the hands, and may be dispensed from a pocket container. This means that it can be used outside at the playground or outside the day-care centre, where washing hands cannot be performed.

Under 1/3 of children and caregivers used paper towels, and the majority of children had their own towel. The latter may sound like a good idea – just like home – but practice shows that the children do not always just use their own towel. Furthermore, their hand hygiene technique is not always adequate, which means that half of what they had on their hands is stuck on the towel after wiping!

Micro-organisms are known to be able to survive up to 24 hours on soiled linen. Correct laun-

**Table II.** Cleaning and laundry habits in 33 day-care centres in Greenland.

| Task                                                                 | Percentage |
|----------------------------------------------------------------------|------------|
| Wash of linen, mattress and pillow covers                           |            |
| Weekly                                                              | 47-53      |
| Not weekly, but more times per month                                | 40-47      |
| Monthly or less often                                                | 3-7        |
| Temperature at wash of linen, mattress and pillow covers            |            |
| 40°C or less                                                        | 7          |
| 60°C                                                                | 71         |
| 80°C                                                                | 7          |
| 90°C                                                                | 14         |
| Change of cloth on baby changing table after changing diaper        |            |
| After each child                                                     | 31         |
| Not after each child, but more times per day                        | 12         |
| Once daily                                                          | 27         |
| Less often                                                          | 23         |
| Don’t know                                                          | 7          |
| Cleaning                                                            |            |
| Floors                                                               |            |
| Daily                                                                | 91         |
| Every second day                                                     | 9          |
| Toys                                                                 |            |
| Daily                                                                | 3          |
| Every second day                                                     | 45         |
| Once weekly                                                         | 48         |
| Monthly or less often                                                | 3          |
| Potties                                                              |            |
| After each child                                                     | 88         |
| Not after each child, but more times daily                          | 0          |
| Once daily                                                          | 8          |
| Less often                                                          | 4          |
| Don’t know                                                          | 7          |
| Baby changing table                                                 |            |
| After each child                                                     | 21         |
| Not after each child, but more times daily                          | 38         |
| Once daily                                                          | 21         |
| Less often                                                          | 21         |

**Figure 1.** Distribution of time spent outdoors among the 33 day-care centres.
dry of linen and towels is therefore of importance for preventing spread of micro-organisms. The recommendation for day-care centres is that all laundry be washed at 80°C for linen – like towels, washcloths or bed linen. Only 4% of the day-care centres did so, while the rest used lower temperatures that are recommended for homes.

50% did their laundry on a weekly basis, which is satisfying.

Cleaning was done daily in all day-care centres, which is in accordance with recommendations. Toys were only washed daily in one of the 33 day-care centres. In times of epidemics of childhood diseases, it is recommended that toys in day-care centres with younger children be washed on a daily basis, although there is little evidence to support this practice.

Each contaminated procedure should be regarded as an individual procedure, but only 31% of day-care centres changed cloth on baby-changing table, although the figure should be 100%.

We found that 24% of the day-care centres had written guidelines for hand hygiene, but most day-care centres were in possession of the guidelines from the Ministry of Social Affairs (“Circular no. 188 concerning precautions against infectious diseases in day-care and residential institutions” prepared in collaboration with the Chief Medical Officer in Greenland) concerning the time of returning to the day-care centre of a child after a period of disease.

As consequence of this study the Chief Medical Officer and Statens Serum Institut (SSI) have after this study drawn up guidelines within all important areas of hygiene. These guidelines have been distributed to all day-care centres in Greenland. Furthermore, as the home is still an important place for learning hygienic habits, the Chief Medical Officer and the SSI have also made a small pamphlet as an introduction to good hygienic habits for homes with small children. This pamphlet is supposed to be given by the health visitors when visiting the small children’s homes.

There is no doubt that for many young parents who are working or studying, staying at home with their children when they are ill, and particularly during the full recovery period, is difficult. Therefore many parents are inclined to let their children attend day-care centres too soon after illness. For those with no social or family network a public babysitting offer could be of great importance.

In conclusion, the day-care centres in general did not follow hygienic recommendations sufficiently, and the hygienic behaviours resembled more those of home. For public institutions this is not sufficient to prevent cross-contamination, as the risk of spread of micro-organisms is high in institutions with many contacts. Caregivers are the most important role models in teaching the child good hygienic habits, such as hand hygiene. Hygienic education of caregivers and early hygienic training of children, preferably in nursery, is therefore important and should be strengthened. This enables the caregivers to act correctly and on a professional basis to avoid cross-contamination in day-care centres.

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