

ALASKA LEGISLATURE COMMITTEE FILES, 1989-1990 86/2

6276 SENATE HEALTH, EDUCATION AND SOCIAL SERVICES

680

**ENVIRONMENTAL
BENEFITS**

A study conducted by Arthur D. Little, Inc. also concluded that disposables create less air pollution to manufacture and require 7 times less water than home-washed products.

TIME IS MONEY

The disposable diapering system trims 78 hours a year in changing efficiency from a caregiver's schedule. This translates into an annual per child savings of \$261 for the minimum wage-earner and \$750 for the average full-time salaried employee.

THE BOTTOM LINE

When laundry costs, product usage, energy utilization and time efficiency are factored into the equation, single-use diaper products are more cost-effective than multiple-use products.

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Dispelling The Myths

THE TRUTH ABOUT DIAPERS

Contact: Wendy Maurice
Phil Wirth
Ellen Werther

THE MSW DEBATE IN PERSPECTIVE

How the Diaper Stacks Up Against the EPA's Agenda for Action

HIERARCHY

To achieve a 25% reduction in municipal solid waste (MSW) by 1991, the EPA advocates a four-tier strategy of : 1) source reduction, 2) recycling and composting, 3) waste-to-energy incineration, and 4) sanitary landfilling.

MSW CONTRIBUTION

Single-use diapers represent less than 2% of MSW. Archeologist Dr. William Rathje of the University of Arizona determined them to be 1% by weight and 1.5% by volume based on actual landfill digs.

SOURCE REDUCTION

The introduction of super-absorbent diapers in 1986 reduced the volume of diapers entering the waste stream by up to 50%.

RECYCLING

Components of single-use diapers, which are primarily cellulose, are recyclable in the manufacturing process and are currently being recycled by the industry. Recycling of diapers is underway in Seattle, WA, with an additional recycling facility scheduled to come on line in early 1990.

COMPOSTING

The high cellulose content of diapers makes them an ideal candidate for municipal solid waste composting. Composting can organically degrade diaper components and up to 60% of MSW into fertile humus for horticultural use.

INCINERATION

Disposable diapers can be incinerated safely in a waste-to-energy facility with no adverse environmental effects. Wood fibers from the cellulose, as well as the plastic liners and backsheets, burn completely and harmlessly when properly incinerated.

- more -

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LANDFILLING

Diapers can be safely landfilled, along with the rest of solid waste, without fear of disease transmission. A recent report of a Scientific Advisory Group headed by Dr. Richard Engelbrecht of the University of Illinois concluded that landfilled infant diapers and adult incontinence products do not pose a public health risk to water supplies, the community, waste handlers or landfill operators.

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THE GREAT DIAPER BIODEGRADABILITY MYTH

- FICTION:** "Biodegradable" diapers are a new and significant improvement over traditional brands.
- FACT:** All diapers -- even those not labeled "biodegradable" -- typically contain by volume up to 90% cellulose, which is entirely biodegradable over time when oxygen and water are present. Unfortunately, nothing much biodegrades in landfills.
- FICTION:** "Biodegradable diapers" break down in landfills.
- FACT:** To break down organically, materials must be exposed to sufficient moisture and nutrients. These conditions are "starved" in modern sanitary landfills to control leaching and groundwater contamination. There is no reputable evidence that "biodegradables" decompose faster in a sanitary landfill situation.
- FICTION:** Diapers labeled as "biodegradable" are environmentally superior.
- FACT:** Six environmental groups advocate a consumer boycott of so-called "degradable" diapers, claiming they don't decompose in oxygen starved landfills, release harmful chemicals when exposed to sun, air and water and complicate recycling. The groups include: the Environmental Defense Fund, the Environmental Policy Institute, Friends of the Earth, Natural Resources Defense Council, Public Citizen and the Coalition for Recyclable Waste.
- FICTION:** A "biodegradable" plastic backsheet is more desirable than one made of standard polyethylene.
- FACT:** One "biodegradable" diaper brand actually uses twice as much more plastic in its backsheet. According to Dr. Daryl Ditz of the Cornell Waste Management Institute, questions persist about the safety of accelerated "biodegradable particles" after decomposition. (If biodegradation were to occur, particle molecules might migrate, become volatile or release chemicals used in the product's manufacture.) Until the environmental consequences and efficiency of these products can be determined, U.S. and Canadian environmentalists advise caution.

- more -

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FICTION: Using "biodegradable" diapers will extend landfill capacity and reduce solid waste volume.

FACT: The starch added to the backsheet of diapers claiming biodegradability increases decomposition by only a fraction of 1%. Sixty percent of what now goes to landfills is "biodegradable." However, landfills are filling up because biodegradation doesn't occur to any great degree under sanitary landfill conditions. Therefore, the EPA Agenda for Action calls on recycling and composting initiatives -- rather than accelerated biodegradation -- as solid waste solutions.

FICTION: Improving the biodegradability of diapers will aid recycling and composting alternatives.

FACT: Cornstarch additives typically used in the manufacture of biodegradable plastic make them unsuitable for recycling. Also, the added plastic used in biodegradable diapers is undesirable in compost.

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Dispelling The Myths

THE TRUTH ABOUT DIAPERS

Contact: Wendy Maurice
Phil Wirth
Ellen Werther

DIAPER DERMATITIS

What Every Parent Should Know About Diaper Rash Prevention

THE PROBLEM

Skin irritation occurs when the skin's protective function is weakened and irritated by trapped urine, fecal enzymes and ammonia-elevated pH levels that occur when urine and feces mix.

HOW DIAPERS HELP

Diapers with absorbent gelling material (AGM) lock urine away from baby's skin, resulting in a drier surface and more normal pH levels.

A MEDICAL OPINION

Pediatric physicians, dermatologists, toxicologists, nurses and public health professionals agree that keeping skin dry is important in maintaining healthy infant skin.

CLINICAL CONFIRMATION

At least 17 research studies, many published in such scientific journals as Pediatric Dermatology, the Journal of The American Academy of Dermatology and the Journal of Pediatric Health Care, confirm the effectiveness of AGM diapers in maintaining healthy infant skin. (See attached bibliography.)

MOTHERS KNOW BEST

Dry skin is a key factor in the decision by 9 out of every 10 parents to use disposable diapers, according to numerous consumer attitude surveys.

HOSPITAL REASSURANCE

Today, over 95% of the nation's hospitals with maternity wards use disposable diapers,

DAY CARE PREFERENCE

A 1988 study in Pediatric Dermatology reported that infants in day care environments are less likely to be affected with skin irritation when diapered in AGM disposables.

ADULT APPLICATION

A nursing home study published in the July '89 issue of Geriatric Nursing reports that 65% of patients improved skin condition with single-use incontinent products.

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SCIENTIFIC PUBLICATIONS ON DIAPER DERMATITIS
AND CLINICAL EVALUATIONS OF INFANT DIAPERS
CONTAINING ABSORBENT GELLING MATERIALS

DIAPER DERMATITIS ETIOLOGY STUDIES

1. Jordan, W.E., Lawson, K.D., Berg, R.W., Franxman, J.J. and Marrer, A.M., Diaper Dermatitis: Frequency and Severity Among a General Infant Population. Pediatric Dermatology 1986; 3:198-207.
2. Zimmerer, R.E., Lawson, K.D., and Calvert, C.J., The Effects of Wearing Diapers on Skin. Pediatric Dermatology 1986; 3:95-101.
3. Berg, R.W., Buckingham, K.W., and Stewart, R.L., Etiology Factors in Diaper Dermatitis: The Role of Urine. Pediatric Dermatology 1986; 3:102-106.
4. Benjamin, L., Clinical Correlates with Diaper Dermatitis. Pediatrician 1987; Suppl. 14:21-26.
5. Berg, R.W., Etiologic Factors in Diaper Dermatitis: A Model for Development of Improved Diapers. Pediatrician 1987; Suppl. 14:27-33.
6. Benjamin, L., Berg, R.W., Jordan, W.E., and Zimmerer, R.E., Etiology of Diaper Rash and the Effects of Diapers on Infant Skin Condition. International Dissolving Pulps Conference, TAPPI March 1987.
7. Gaunder, B.N. and Plummer, E., Diaper Rash: Managing and Controlling a Common Problem in Infants and Toddlers. Journal of Pediatric Health Care 1987; 1:26-34.
8. Berg, R.W., Etiology and Pathophysiology of Diaper Dermatitis. Adv. Dermatol 7, 75-98 (1988).

CLINICAL STUDIES WITH ABSORBENT GELLING MATERIAL DIAPERS

9. Campbell, R.L., Clinical Tests with Improved Disposable Diapers. Pediatrician 1987; Suppl. 14:34-38.
10. Seymour, J.L., Keswick, B.H., Milligan, M.C., Jordan, W.P. and Hanifin, J.M., Clinical and Microbial Effects of Cloth, Cellulose Core, and Cellulose Core/Absorbent Gel Diapers in Atopic Dermatitis. Pediatrician 1987; Suppl. 14:39-43.

11. Keswick, B.H., Seymour, J.L. and Milligan, M.C., Diaper Area Skin Microflora of Normal Children and Children with Atopic Dermatitis. Journal of Clinical Microbiology 1987; 25:216-221.

CLINICAL STUDIES WITH ABSORBENT GELLING MATERIAL DIAPERS

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14. Campbell, R.L., Bartlett, A.V., Sarbaugh, F.C. and Pickering, L.K., Effects of Diaper Types on Dermatitis Associated with Diarrhea and Antibiotic Use in Children in Day Care Centers, Pediatric Dermatology 1988; 5:83-87.
15. Austin, A.P., Milligan, M.C., Perrington, K. and Tweito, D.H., A Survey of Factors Associated with Diaper Dermatitis in Thirty-six Pediatric Practices. J. Ped. Health Care 2, 295-299 (1988).

MICROBIOLOGY EVALUATIONS OF ABSORBENT GELLING MATERIALS

16. B.H. Keswick, Evaluation of the Growth of Microorganisms in Diaper Absorbant Materials. Journal of Industrial Microbiology 3, 21-28 (1988).

POSTER PRESENTATIONS

17. Seymour, J.L., Keswick, B.H. and Milligan, M.C., Comparison of Diaper Rash in Babies with Atopic Dermatitis as Influenced by Diaper Type. Poster Session, American Academy of Dermatology Forty-fifth Annual Meeting, December 1986.
18. Campbell, R.L., Bartlett, A.V., Sarbaugh, F.C. and Pickering, L.K., Effects of Diaper Types on Diaper Dermatitis Associated with Diarrhea and Antibiotic Use in Infants and Toddlers. Poster Session, American Academy of Dermatology Forty-sixth Annual Meeting, December 1987.

SYMPOSIUM PROCEEDINGS

19. Proceedings of an International Symposium, Diapering and Infant Skin Care, Hakone, Japan, June 12, 1986, Pediatrician 14 S1 (1987)
20. Diaper Dermatitis: Later Insight into Pathogenesis, Prophylaxis, and Therapy, Proceeding of Second International Conference on Diapering and Infant Skin Care, Dortmund, Germany. Editors Prof. Dr. H. Tronnier and Dr. G.J. Schmitt.



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THE TRUTH ABOUT DIAPERS

Contact: Wendy Maurice
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ADULT INCONTINENCE

Coping with an Uncontrollable Condition

THE PROBLEM

More than 10 million adults in the United States suffer to some degree from impaired bladder control, a condition that typically restricts mobility, reduces independence and lowers self-esteem. The sedentary lifestyle of geriatric patients in nursing homes also makes them particularly susceptible to the weakening of delicate skin.

HOW INCONTINENCE PRODUCTS HELP

Single-use briefs can help adults eliminate embarrassing accidents and unpleasant odors comfortably and confidently. Their high absorbency results in drier skin and reduced occurrence of skin irritation and infection.

CAREGIVER BONUS

Today, more than 70 percent of the nation's nursing homes use single-use incontinence products. A study published in 1988 by the National Foundation for Long Term Health Care (NFLTHC) found disposables required 25% fewer changes than other products and eliminated 78% of all leaks.

QUALITY TIME

Disposable incontinent management systems yield fewer, quicker changes and clean ups. In a typical 100-bed nursing facility, this frees up 4 full-time nurse assistants for more demanding, intensive care.

SKIN CARE CONFIRMATION

A 1987 NFLTHC study reported that nursing homes in Ohio that did not use single-use incontinence products had three times more skin irritation among patients. The same study also disclosed that nursing homes in Colorado that did use single-use products had a lower incidence of irritation.

COST-EFFECTIVENESS

A report published in the July 1989 issue of Geriatric Nursing calculated the cost savings of single-use vs. multiple-use incontinent products to be \$18,000, on an annual basis, for a 150-bed nursing home.

ENVIRONMENTAL NOTE

Single-use adult incontinence products represent less than 1/10th of one percent of the municipal waste stream.

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THE PROCTER & GAMBLE COMPANY

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1 PROCTER & GAMBLE PLAZA, CINCINNATI, OHIO 45202-3315

February 27, 1990

Mr. Dave Moses
P.O. Box V
Juno, Alaska 99811

Dear Mr. Moses:

Here are some information kits related to the subject of
"biodegradability in disposable diapers."

I would appreciate your providing these copies to the members of the
Senate Health Committee, as we discussed today.

And, when Senate Bill 441 is actually sent for a hearing, I would be
grateful if you would call me as soon as possible so that we might arrange
to send some of our experts on biodegradability and disposable diapers to
participate in the hearing.

Thanks again for the information you provided me today. I will
probably give you a call every week or so on this subject and look forward
to working with you.

Sincerely,

Robert B. Stewart

Robert B. Stewart

RBS441:eof

Attachments

Research Update:

Etiology of
Diaper Dermatitis

CORRECTION

**THIS DOCUMENT
HAS BEEN REPHOTOGRAPHED
TO ASSURE LEGIBILITY**

Research Update:

...ology of
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CORRECTION

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Etiology of Diaper Dermatitis

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<i>Abstracts of Scientific Publications</i>	<i>Inside Back Cover</i>

This booklet was prepared for you by the makers of Ultra Pampers Plus because we know that when your patients turn to you for advice, you want to give them the most current and accurate information available. We hope you find this booklet informative. For your convenience, a selection of key scientific abstracts is enclosed at the back of the booklet.

Historical Perspective

Though diaper dermatitis was described in the medical literature as early as 1877 (1), it was not until 1905 that Jacquet (2) clearly defined the commonly occurring lesions and differentiated them from congenital syphilis. This point was also stressed by Adamson in 1908 (3). He identified simple irritation, streptococcal impetigo and seborrheic dermatitis as three common causes of dermatitis in the diaper area that needed to be distinguished from syphilis. He also proposed that "wet or soiled napkins" were a probable source of the local irritation observed in diaper dermatitis, but did not suggest a specific cause for the irritation.

The first attempt to identify the irritant source in diapers was by Zahorsky in 1915 (4). He used a series of case reports in which he noted the presence of both "ammoniacal diapers" and diaper dermatitis to conclude that ammonia was the primary source of irritation in diapers.

Zahorsky's proposal that irritation of the diaper region was caused by the presence of ammonia in diapers was further developed and reinforced in publications by Cooke in 1921 (5) and 1926 (6). He reported the isolation of a gram-positive bacillus from stool samples of infants with ammoniacal diapers. He called the organism *Bacillus ammoniagenes* after demonstrating that it produced ammonia from urine. On the basis of experiments with these bacteria, Cooke concluded that "the common erythematous or papulovesicular dermatitis of the gluteal region in infants is caused by ammonia in the diaper..."

The idea that direct irritation from ammonia in diapers was the primary cause of diaper dermatitis remained essentially intact and unchallenged until 1955. At that time, Rapp (7) reported that pads wetted with putrefied urine, which did not contain ammonia, caused skin irritation that was not pH dependent. He concluded that toxins produced from the enzymatic breakdown of amino acids in urine also contributed to the irritation of diaper dermatitis.

Further recognition that irritation leading to diaper dermatitis did not have a single source was provided by Burgoon, Urbach and Grover in 1961 (8). They divided the causes of diaper dermatitis into two major categories, predisposing factors and activating factors. The predisposing factors included reactive skin, seborrheic diathesis and systemic disease. The activating factors included maceration, sweat retention, contactants,

goneigenic factors, infection and trauma. A similar concept was also used in a classification system proposed by Koblenzer in 1973 (9). He suggested that skin diseases in the diaper area should be divided into the following categories:

1. Those occurring whether or not diapers are worn.
2. Those indicative of latent tendencies which are triggered by the wearing of diapers.
3. Those occurring in nonpredisposed individuals, as a direct consequence of wearing the diapers.

The classification systems of Burgoon et. al. (8) and Koblenzer (9) emphasized the importance of activating factors in the development of diaper dermatitis. At this time, ammonia from urine was still considered one of the most common activating factors. However, this began to change after Leyden et. al. (10) published a study on ammonia levels in urine from infants with and without diaper dermatitis. No significant difference was found in the urinary ammonia levels for the two groups. In addition, experimental application of highly ammoniacal urine on intact adult or infant skin did not produce irritation.

The demonstration by Leyden et. al. (10) that ammonia does not irritate intact skin, even at concentrations much higher than those measured in "ammoniacal diapers" again raised the question of what agent or mechanism is responsible for the development of diaper dermatitis. The answer to this question may be found in recent studies showing that wetness in the diaper area causes normal skin to be compromised. When skin is compromised, normal fecal proteases and lipases act as primary irritants in the diaper environment, as bile salts and increased alkalinity from the mixture of urine and feces potentiate their action on the skin.

With this information, a deductive model for irritant diaper dermatitis has been developed. The key elements of this model, the work that led to its development and the clinical studies that verified its accuracy are presented in the following sections of this booklet.

What Causes Diaper Dermatitis

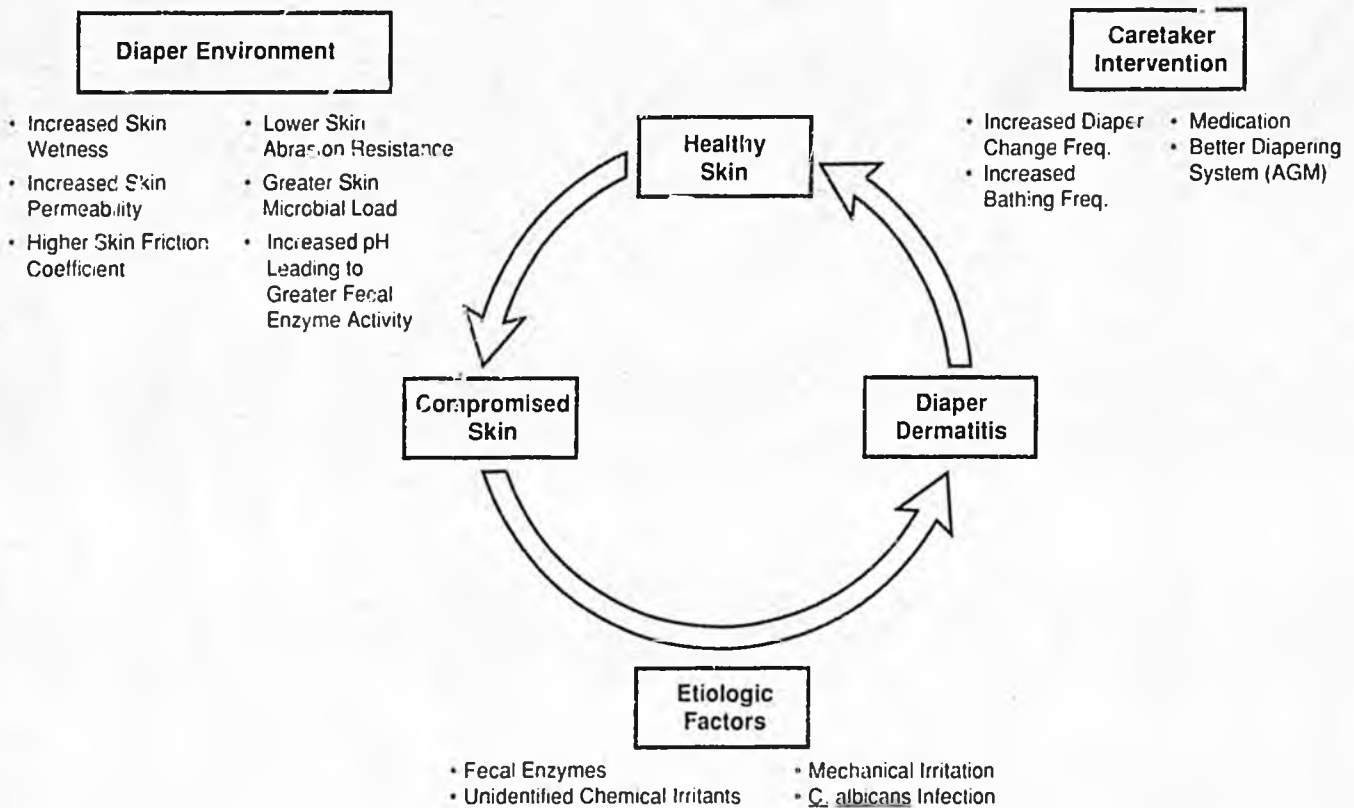
An intensive research program has been conducted to more fully understand the causes of diaper dermatitis. The key concepts developed from this work are presented below. A more detailed account of this area is available in a review by R.W. Berg (Abstract #1).

The investigations on the mechanisms of diaper dermatitis indicate that it is a cyclic process made up of three distinct stages.

Stage 1: Healthy Skin Becomes Compromised

The diaper dermatitis cycle begins when the protective function of the normal infant's stratum corneum is weakened or compromised. There are several ways that healthy skin can become compromised.

Wetness - Urine trapped in the semi-occluded environment of the diaper causes the skin to become hydrated. Hydrated skin is more susceptible to abrasion, is more easily penetrated by irritants and has increased numbers of microorganisms.



Fecal enzymes - The protease and lipase enzymes that are naturally present in feces attack the skin and cause irritation. Even in the absence of frank irritation, skin permeability is increased.

Interaction of urine and feces - Ammonia is formed when urease produced by fecal bacteria is allowed to act on the urea in urine. The ammonia raises the pH of the diaper environment. This leads to an increase in the activity of the protease and lipase enzymes present in feces and increased skin permeability. Both factors contribute to increased skin damage.

Stage 2: Attacks on Compromised Skin Can Lead To Diaper Dermatitis

Weakened or compromised skin is less able to act as a protective barrier. As a result, the following factors can work individually or in combination to cause an episode of diaper dermatitis.

Friction - The action of skin rubbing against skin or against the diaper, can result in chafing and skin damage.

Chemical and enzymatic irritation - Fecal proteases and lipases, in addition to other substances commonly present in urine and feces, can cause further irritation of the skin and lead to the development of irritant contact dermatitis.

Microbial infection - Microorganisms in the stool, especially *Candida albicans*, may infect the compromised skin. The longer lasting, more severe episodes of diaper dermatitis are often the result of candidal infections.

Stage 3: Restoration of Normal Skin

Resolution of the dermatitis, usually within 2 to 3 days, completes the cycle. Common diaper dermatitis tends to be self-limiting and episodic in nature. Caretaker intervention may play a role in the process. Changes in habits and practices, such as more frequent diaper changes or use of medications, are usually begun as the condition of the skin first begins to deteriorate. These actions allow the skin to return, at least temporarily, to a more normal state.

Interrupting The Diaper Dermatitis Cycle

The research that led to the development of this model for diaper dermatitis also led to the use of an absorbent gelling material (AGM) in diapers. The addition of AGM to the absorbent core of a diaper has three effects:

1. Reduced movement of wetness out of the diaper onto the skin.
2. Buffering at a pH close to that of normal skin is provided.
3. Mixing of urine and feces is decreased. This decreases ammonia formation and subsequent increases in pH and fecal enzyme activity.

Because of these actions, it was predicted that the AGM diapers would keep diapered skin dryer and at a more normal pH. If the diaper dermatitis model is correct, this should lead to a decrease in the incidence and severity of diaper dermatitis. To test this prediction, AGM diapers (Ultra Pampers) were compared with conventional disposable and home-laundered cloth diapers in a series of studies involving over 1600 children with normal skin, as well as atopic children, children on oral antibiotic therapy, and children with diarrhea. As predicted by the model, the results from these studies show that children who wore AGM diapers had dryer skin and less diaper rash.

Developments of the Diaper Dermatitis Model

In 1977, Leyden et. al. (10) demonstrated that an aqueous 1.6% solution of ammonia, five times the mean level found in diapers from infants with diaper dermatitis, was not irritating to the intact skin of either adults or infants. This work clearly challenged the notion that ammonia in soiled diapers was the primary cause of irritant diaper dermatitis, and reopened the question of what factor or factors were responsible for the development of diaper dermatitis. In the early 1980's, a series of studies was conducted to provide definitive information on the etiology of diaper dermatitis. The ultimate goal of this program was to use this information to develop a diaper that would result in a decreased incidence and/or severity of diaper dermatitis.

The investigations began with a series of clinical studies to identify factors which correlated with the frequency and severity of diaper dermatitis. These studies, reported by Jordan et. al. (Abstract #2) and Benjamin (Abstract #3), showed that age, diet, bowel movement frequency and diaper type were important factors in the occurrence of diaper dermatitis. This initial work led to detailed mechanistic studies on the development of diaper dermatitis.

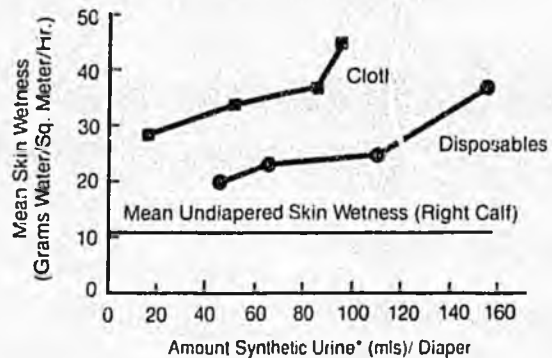
The Role of Wetness

The first of these mechanistic studies focused on skin wetness. Previous work had suggested that increased levels of skin hydration may be important in the development of diaper dermatitis (11,12,13). To study this question, Zimmerer et. al. (Abstract #4) used patches made from both cloth and disposable diaper material loaded with synthetic urine. Using this model it was found that skin wetness was increased more with cloth diaper patches than with the disposable diaper patches. Measurements of skin wetness in the diaper area of infants wearing conventional disposable or cotton cloth diapers prewetted with synthetic urine confirmed this observation (Figure 1). Additional studies revealed several important characteristics of wet skin. First, skin that is wet is more permeable to low molecular weight compounds than skin that is dry. This suggests that the hydrated skin in the diaper area is probably more susceptible to low-molecular weight irritants than undiapered skin. Second, wet skin has a higher coefficient of friction and is

more susceptible to abrasion than dry skin. Finally, wet skin supports more microbial growth than dry skin.

Figure 1.

Effect of Prewetted Diapers on Infant Skin Wetness[†]



*Distilled water containing 1% NaCl and 0.0025% Triton X-100

† Adapted from Zimmerer et. al. (Abstract #4).

The Roles of Feces and Urine

In its most common form, diaper dermatitis is an acute, irritant contact dermatitis. Though feces and urine are the two obvious sources of irritation in the diaper environment, identification of the specific components responsible for their action has been a source of controversy. To resolve this controversy, studies were done to clearly define the roles of feces and urine in the etiology of diaper dermatitis.

Using the hairless mouse as a model system, Buckingham and Berg (Abstract #5, determined that the protease and lipase enzymes normally present in the feces of infants are responsible for most of the irritation caused by infant stool. Two other points, of equal importance, were also noted. First, enzymes not only irritate the skin directly, but also increase the susceptibility of the skin to other potential irritants such as bile salts. Second, protease and lipase activity increases sharply with a rise in pH. For this reason, small increases in the pH of the diaper environment could significantly increase the activity and irritancy of the enzymes in infant feces.

Berg et. al. (Abstract #6) found that the irritation potential of urine by itself was minimal. However, the combination of infant feces and urine caused significantly higher levels of irritation than that caused by feces alone. Further work showed that combining urine and feces allowed the formation of ammonia which caused

an increase in both the pH and the irritancy of the feces/urine mixture.

These observations were significant for two reasons. First, they were in agreement with findings on how diet and bowel movement frequency affect the occurrence of diaper dermatitis as noted in a clinical survey study of over one thousand infants (Abstracts #2 and #3). Second, they showed that the historic association between ammonia and diaper dermatitis was not wrong, but a misinterpretation. The primary irritants in the diaper environment are fecal protease and lipase, not ammonia. However, the activity and irritancy of the enzymes is increased when ammonia, formed by the action of fecal urease on urine, causes a rise in the pH of the diaper environment.

With the facts in hand, it was finally possible to propose a model for the development of diaper dermatitis (Abstracts #7, #8 and #9). The key aspects of the model are illustrated in the figure on page 4 of this booklet. In summary, it shows that wetness creates conditions which compromise the integrity of healthy skin. In this hydrated state, the skin is more susceptible to damage by abrasion, has a higher microbial load and its ability to act as a barrier is decreased. The skin is further compromised by increased fecal protease and lipase activity that occurs as the diaper area pH rises due to the presence of ammonia formed by the action of fecal urease on urine. The result is the development of diaper dermatitis. The cycle is completed over a period of 2 to 3 days as the dermatitis is resolved. Action by the infant's caretaker, such as more frequent diaper changes, more thorough cleaning of the diaper area and the use of topical medication, probably plays a role in the resolution of the dermatitis.

Clinical Confirmation of the Diaper Dermatitis Model

The results of laboratory experiments indicated that increases in skin wetness, skin pH and fecal enzyme activity are key factors involved in the development of diaper dermatitis. On the basis of this information, it was proposed that a diaper capable of minimizing the occurrence of these conditions would decrease the incidence and severity of diaper dermatitis in the infants

who wore them. To achieve these effects, an absorbent gelling material (AGM) was added to the cellulose core of disposable diapers.

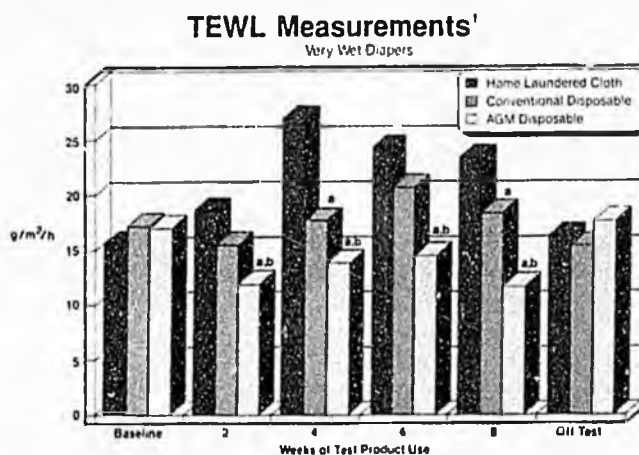
The AGM is a cross-linked polymer of sodium polyacrylate. This nontoxic material holds urine tightly and provides buffering capacity in the pH range of normal skin. It was predicted that by including AGM in the diaper core there would be a decrease in skin wetness, more normal skin pH, and less mixing of urine and feces resulting in lower fecal enzyme activity. The ability of AGM diapers to safely and effectively produce these effects, and to decrease the incidence and severity of diaper dermatitis, was tested and validated in an extensive series of clinical and microbiological studies using home-laundered cloth, conventional disposable, and AGM disposable diapers (Ultra Pampers).

Studies in Infants with Normal Skin

A series of four controlled clinical studies was conducted among infants with normal skin (Abstracts #10 and #11). Earlier reports by Grant et. al. (14), Wiener (15) and Stein (16) have reported conflicting results about the effectiveness of cloth and disposable diapers in controlling diaper dermatitis. In the studies presented here, AGM disposable diapers were tested against conventional disposable and home-laundered cloth diapers, using a protocol that controlled variables, other than the diaper, that could affect the occurrence of diaper dermatitis.

The results from these four clinical studies show that infants who wore AGM diapers had lower skin wetness (Figure 2) and more normal

Figure 2.

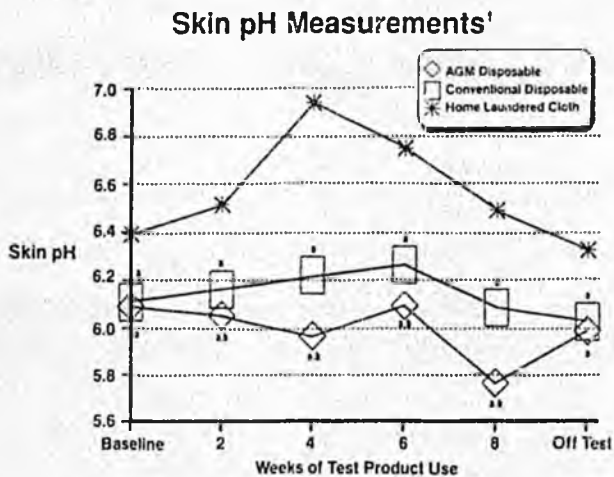


^aStatistically significant (p < 0.05) difference from home-laundered cloth

^{ab}Statistically significant (p < 0.05) difference from conventional disposable diapers

¹Adapted from Campbell et al. (Abstract #10)

Figure 3.

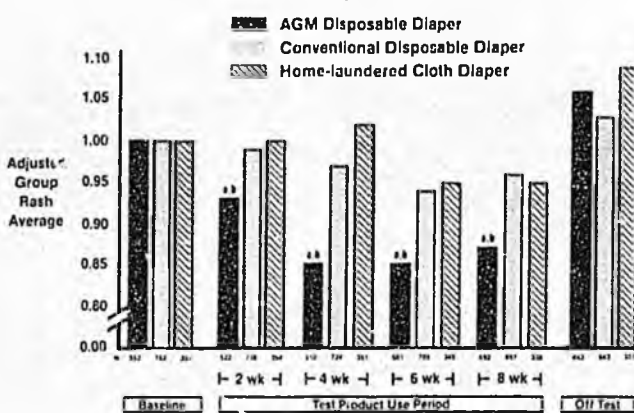


*Statistically significant ($p < 0.05$) difference from home-laundered cloth
 †Statistically significant ($p < 0.05$) difference from conventional disposable diapers
 ‡Adapted from Campbell et al. (Abstract #10)

skin pH (Figure 3). An aggregate analysis across all studies showed a lower incidence of diaper dermatitis among infants who wore AGM diapers relative to those who wore conventional disposable or cloth diapers (Figure 4).

Figure 4.

Composite Diaper Clinicals Analysis[†]



*Significantly less ($p < 0.05$) than home-laundered cloth group
 †Significantly less ($p < 0.05$) than conventional disposable diaper group
 ‡Adapted from Campbell et al. (Abstract #10)

Evaluation in Infants Prone to Diaper Dermatitis

Diarrhea and the use of oral antibiotics are often associated with an increase in the incidence and/or severity of diaper dermatitis. Both diarrhea and oral antibiotic use are more frequent among children at day care centers than in a general population. In order to get a more complete assessment of the impact that use of AGM diapers has on the occurrence of diaper dermatitis,

Campbell et al. (Abstract #12) conducted a prospective study on the frequency and severity of diaper dermatitis among children at day care centers. The results showed that children who wore AGM diapers had a lower mean diaper dermatitis grade during diarrhea episodes and periods of oral antibiotic use than children using conventional disposable diapers. Cloth diapers were not evaluated in this study since they were not normally used at the day care centers.

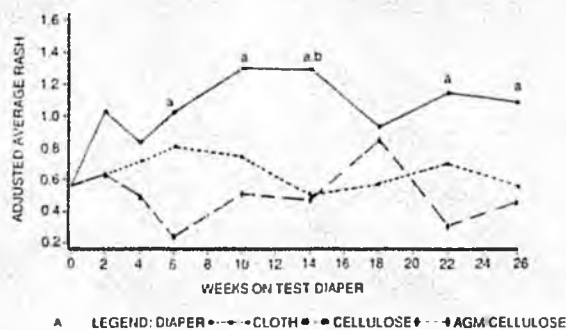
Evaluation in Infants with Atopic Dermatitis

The results of the clinical studies among infants with normal skin and among children with diarrhea or using oral antibiotics, clearly demonstrated that AGM diapers provide an environment that helps maintain the health of the skin in the diaper area. However, not all infants have the advantage of beginning life with normal skin. Atopic dermatitis is an inherited, cutaneous inflammatory condition that commonly occurs during infancy and affects up to 10% of children. It is characterized by dry, erythematous and highly pruritic skin which becomes excoriated, eroded and exudative as a result of rubbing and scratching. Increased hydration of the affected areas is important in relieving the dryness and pruritis associated with atopic dermatitis. Since AGM diapers cause less skin hydration than conventional disposable or cloth diapers, the question was raised whether the decreased level of skin wetness would increase susceptibility of the diaper area to irritation and result in an increased frequency of diaper dermatitis among infants with atopic dermatitis.

To address this question, a prospective, blind study was conducted to determine the relationship of home-laundered cloth, conventional disposable and AGM disposable diapers to the occurrence of diaper dermatitis in normal infants and infants with atopic dermatitis (Abstracts #13 and #14). As shown in Figure 5, at 5 of 8 grading periods, the group of infants with atopic dermatitis that wore AGM diapers had lower mean dermatitis grades than the conventional disposable diaper groups and had significantly lower scores than the home-laundered cloth group. These results clearly show that the use of AGM diapers does not make atopic skin in the diaper area more susceptible to irritants that cause diaper dermatitis.

Figure 5.

Average diaper rash grades for the three diaper test groups with atopic dermatitis[†]



a) significantly higher than AGM cellulose diaper groups ($p < 0.05$)

b) significantly higher than cellulose diaper groups ($p < 0.05$)

† Adapted from Seymour et al. (Abstract #14)

Microbiological Evaluations

Cloth, conventional disposable and AGM diapers were compared for their ability to affect microbial growth both *in vitro* and on diapered skin (Abstract #15). An *in vitro* study was done to determine if any of the diaper materials, when wetted with urine, contributed to the bacterial nutrient pool or if they enhanced the growth capacity of the substrate surface. In the presence of urine, none of the diaper materials assisted in the growth of selected microorganisms isolated from the skin (Table 1).

Studies on the microbiology of diapered skin also included a comparison of the microbial skin flora of atopic and nonatopic infants and the effect of diaper type on the balance of skin microflora. The only significant difference was a higher isolation frequency of *Staphylococcus aureus* from the skin of atopics. The association between the presence of *S. aureus* and atopic disease is well known (17).

Comparison of the microflora in diapered and nondiapered areas, showed that none of the diapers tested caused a change in the microfloral balance. However, the number of organisms on diapered skin was closer to that of undiapered skin for infants that used the AGM diapers. This is probably because the AGM diaper keeps the skin drier than cloth or conventional disposable diapers.

Table 1.

Organism	Starting Inoculum (\log_{10} CFU/ml)	Diaper Swatches [†]	Growth of Microorganisms on Diaper Swatches [†]			
			Log ₁₀ CFU/ml at Incubation Time (h):		Log Change From 0 h at Incubation Time (h):	
			5	24	5	24
<i>C. albicans</i>	3.5	None	3.9	7.2	0.5	3.6
		Disposable	3.9	6.8	0.5	3.3
		AGM Disposable	4.1	6.9	0.6	3.5
		Cloth	3.9	7.7	0.4	4.2
<i>S. aureus</i>	4.3	None	4.6	8.0	0.5	3.7
		Disposable	5.0	7.8	0.7	3.5
		AGM Disposable	4.2	6.9	-0.2	2.5
		Cloth	5.1	8.0	0.8	3.7
<i>E. coli</i>	3.4	None	4.1	8.9	0.7	5.5
		Disposable	4.6	9.3	1.1	5.9
		AGM Disposable	4.3	8.9	0.8	5.6
		Cloth	4.3	9.1	0.8	5.6
<i>P. vulgaris</i>	3.6	None	3.7	7.8	0.2	4.5
		Disposable	4.0	8.3	0.4	5.1
		AGM Disposable	3.8	8.6	0.3	5.4
		Cloth	3.6	7.5	0.0	4.3

[†] Diaper swatches (diameter, 2 in. [5.08cm]) were inoculated with the test organisms suspended in urine at 10 times the volume per weight and incubated for either 5 or 24 h at 37°C. Values are the means of duplicate experiments.

† Adapted from Keswick et al. (Abstract #15).

Conclusion:

The results of laboratory studies led to the proposal of a model that describes the etiology of diaper dermatitis. The model predicted that skin wetness, skin pH and fecal enzyme activity are important factors in the development of diaper dermatitis. The results of the clinical and microbiologic studies noted above, clearly support the model by showing that a disposable diaper containing AGM can safely and effectively reduce the occurrence and severity of diaper dermatitis through its ability to maintain a healthier, environment for skin by reducing skin wetness, maintaining a more normal skin pH and reducing the mixing of urine and feces.

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ABSTRACT #1

ETIOLOGY AND PATHOPHYSIOLOGY OF DIAPER DERMATITIS

Ronald W. Berg, Ph.D.
The Procter & Gamble Company, Cincinnati, Ohio
Adv Dermatol 3:75-98, 1988

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Common diaper dermatitis is a group of skin disorders that result from attack of the skin by physical, chemical, enzymatic, and microbial factors in the diaper environment. The integrity of healthy skin is compromised by the very nature of the diaper environment, and normal intact skin therefore remains an elusive goal of current diapering practices. Moist occlusion promotes miliaria, and causes an increase in the coefficient of skin friction. Skin hydration and an increase in skin pH result in impaired barrier function, and fecal enzymes begin to attack the skin, further degrading its normal ability to cope with its environment. Skin in this weakened state is susceptible to a variety of biological, chemical, and physical insults that can cause or aggravate diaper dermatitis. These include attack of the skin by fecal enzymes and other irritants in urine and feces, mechanical abrasion, and infection by *C. albicans*.

Diapering is unquestionably an effective and convenient way of localizing an infant's excreta. Unfortunately, infant skin was not designed to cope continuously in the resulting environment, and is frequently unable to weather this assault. However, by improving the inherently adverse relationship between diapers and diapered skin, one can have a significant effect on the incidence and severity of diaper dermatitis. A diaper that keeps skin drier will result in skin that is less permeable to irritants, supports less microbial growth, is less susceptible to chafing damage, and has less contact with irritants in urine and feces. A diaper that maintains the environment closer to the normal acidic pH of skin will promote skin that is less permeable to irritants, and reduce the irritancy of fecal enzymes. Finally, a diaper that limits the mixing and spreading of urine and feces will result in less potentiation of enzyme activity and less contact of the skin with fecal irritants.

Diaper dermatitis, by definition, cannot exist in the absence of diapers. Moreover, diaper dermatitis will become less troublesome for the infant population to the degree that diapered skin can be provided an environment closer to that of undiapered skin.

ABSTRACT #2

DIAPER DERMATITIS: FREQUENCY AND SEVERITY AMONG A GENERAL INFANT POPULATION

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Pediatric Dermatology 3 (3): 198-207, 1986

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The frequency and severity of diaper dermatitis was measured among a Midwestern suburban population of 1089 infants ranging in age from 1 to 20 months. No diagnosis of specific etiology was made. Fecal samples were collected and analyzed for *Candida albicans*, and information on family characteristics, infant diet, general health, history of rash, and diapering habits and practices was collected by questionnaire. The distribution of the severity of observed diaper rash can be described as a logarithmic-normal function, implying several multiplicative causative factors. Within the total severity range, there appear to be three subcategories of diaper rash, differing in some manner, perhaps reflecting different etiologies. The frequency of observed diaper rash was a function of the maturity of the infant, reaching a maximum around 9 to 12 months of age. The prevalence of severe rash correlated with the presence and level of fecal *C. albicans*. Infants diapered exclusively in disposable diapers showed less rash ($P < 0.001$) than those diapered exclusively or sometimes in cloth diapers.

ABSTRACT #3

CLINICAL CORRELATES WITH DIAPER DERMATITIS

Lawrence Benjamin, Ph.D.
The Procter & Gamble Company, Cincinnati, Ohio
Diapering and Infant Skin Care. Proc. Int. Symp., Hakone 1986
Pediatrician 14: suppl. 1, 21-26, 1987

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Three types of clinical studies were carried out to better understand diaper dermatitis in a general infant population. In 'snapshot' clinical studies, skin condition under the diaper was evaluated at a given point in time across a large base of infants. Correlations were sought between diaper dermatitis incidence and severity and a number of factors, including sex, diet, maturity, type of diaper, history of allergy, contact with fecal matter, presence of *Candida albicans*, and diaper change frequency. Severe diaper rash correlated strongly with the presence of *C. albicans*, and the frequency of rash correlated with duration of contact with feces and inversely with diaper change frequency. Diaper rash peaked at ages 9-12 months and was lower for breast-fed than for formula-fed infants. Exclusive use of disposable diapers correlated with lower rash levels than when some or all cloth diapers were used. In a longitudinal study, infants were observed daily for 50 days in order to determine the frequency and duration of rash episodes. In this study, the tendency for some infants to be rash-prone was clearly indicated. In a third type of study, over 10,000 infant visits to physicians' offices were used to record skin condition. Results showed a three- to four-fold increase in diaper rash if the child had diarrhea during the previous 48 h.

ABSTRACT #4

THE EFFECTS OF WEARING DIAPERS ON SKIN

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Pediatric Dermatology 3 (2): 95-101, 1986

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Wearing dry and wet cloth and disposable diaper materials has certain effects on the degree of skin wetness. These, in turn, affect the coefficient of skin friction, the skin's susceptibility to abrasion damage, its permeability, and its support of microbial growth. These effects were explored using an adult model wearing forearm patches. The adult model was validated by comparisons of skin wetness and friction values for infants and adults determined under similar conditions. Skin wetness was proportional to diaper wetness. With increased skin wetness, there were increased coefficients of friction and increased abrasion damage, skin permeability, and microbial growth. Cloth diaper material produced wetter skin than did disposable diaper material at equivalent loadings.

ABSTRACTS #5

ETIOLOGIC FACTORS IN DIAPER DERMATITIS: THE ROLE OF FECES

Kent W. Buckingham, Ph.D., and Ronald W. Berg, Ph.D.
The Procter & Gamble Company, Cincinnati, Ohio
Pediatric Dermatology 3 (2): 107-112, 1986

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While the etiology of diaper dermatitis in infants is complex, it is generally believed to involve an interaction between skin and irritants in feces and urine. Proteases and lipases were identified as the major irritants in the feces of infants, and bile salts were found to potentiate the damage produced by the action of fecal enzymes on skin. Fecal enzymes also increased the permeability of skin, thereby increasing potential susceptibility to other irritants in the diaper environment.

ABSTRACT #6

ETIOLOGIC FACTORS IN DIAPER DERMATITIS: THE ROLE OF URINE

Ronald W. Berg, Ph.D., Kent W. Buckingham, Ph.D., and Robert L. Stewart
The Procter & Gamble Company, Cincinnati, Ohio
Pediatric Dermatology 3 (2): 102-106, 1986

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Diaper dermatitis may result after repeated or prolonged contact of skin with urine and feces. A hairless mouse model was used to elucidate the role of urine in this process. The results of this work suggest that an important function of urine in the etiology of diaper dermatitis is to increase the pH of the diaper environment by breaking down urea in the presence of fecal urease. This rise in pH increases the activities of fecal proteases and lipases, which can damage skin. Urine can also increase the permeability of diapered skin to irritants and can directly irritate skin when exposure is prolonged.

ABSTRACT #7

ETIOLOGIC FACTORS IN DIAPER DERMATITIS: A MODEL FOR DEVELOPMENT OF IMPROVED DIAPERS

Ronald W. Berg, Ph.D.
The Procter & Gamble Company, Cincinnati, Ohio
Diapering and Infant Skin Care. Proc. Int. Symp., Hakone 1986
Pediatrician 14: suppl. 1, 27-33, 1987

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Common diaper dermatitis is an episodic disease that results from attack of the skin by physical, chemical, enzymatic, and microbial factors in the diaper environment. A model for the cyclic nature of this disease has been developed which incorporates various roles these factors play as they interact to produce skin with compromised physical properties, and further damage it to produce diaper dermatitis. Resolution occurs naturally or through caretaker intervention, resulting in mean episodic durations of 2-3 days. The model predicts that preventing excessive skin hydration, maintaining skin near its normal physiologic pH, and minimizing interaction of urine and feces (which increases pH and fecal enzyme activity) will result in decreased incidence and severity of diaper dermatitis.

ABSTRACT #8

ETIOLOGY OF DIAPER RASH AND THE EFFECTS OF DIAPERS ON INFANT SKIN CONDITION

L. Benjamin, Ph.D., R. W. Berg, Ph.D., W. E. Jordan, Ph.D., and R. E. Zimmerer, Ph.D.
The Procter & Gamble Company, Cincinnati, Ohio
International Dissolving Pulps Conference,
TAPPI: 265-268, March, 1987

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The skin in the diapered area of infants is adversely affected by the environment created by diaper wearing, and diaper rash is a common result of exposure to this environment. Changes in diaper construction and materials can promote skin which is drier, less permeable to irritants, supports less microbial growth, is less susceptible to chafing damage, and has less contact with irritants in urine and feces. The result is skin which is less prone to diaper rash.

ABSTRACT #9

DIAPER RASH: MANAGING AND CONTROLLING A COMMON PROBLEM IN INFANTS AND TODDLERS

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J. Pediatr Health Care 1: 26-34, 1987

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Knowledge of the most current and valid scientific data available should serve as the basis for health care that is either given or recommended. Using this framework, this article presents recent research reported by scientists about the causes and occurrences of diaper rash. A model illustrating the process of the development of diaper rash is suggested from these recent research findings. Contributing factors to diaper rash are stated and management by prevention is emphasized. This article also assesses early signs of diaper dermatitis, differentiates the common types of these rashes, and recommends nursing interventions and common treatments.

ABSTRACT #10

CLINICAL STUDIES WITH DISPOSABLE DIAPERS CONTAINING ABSORBENT GELLING MATERIALS: EVALUATION OF EFFECTS ON INFANT SKIN CONDITION

Robert L. Campbell, Ph.D., Jon L. Seymour, Ph.D., Logan C. Stone, Ph.D.,
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J Am Acad Dermatol 17: 978-987, 1987

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Disposable infant diapers with absorbent gelling material (cross-linked sodium polyacrylates) incorporated into the core were clinically evaluated for their effect on infant skin condition. Absorbent gelling materials tightly hold water and provide pH control by a buffering capacity as well as by helping to segregate urine apart from feces. Four clinical studies were conducted with each following a rigid protocol that controlled for variables of diet and age in addition to the diaper material that may influence the development of diaper dermatitis and helped to control for any inherent bias in the study. This allowed for the controlled assessment of skin condition with respect to diaper type. Absorbent gelling material-containing disposable, conventional (100% cellulose core) disposable, and home-laundered cloth diapers were test products. In these studies 1614 infants were initially enrolled with 522 of them assigned to absorbent gelling material disposable, 738 to conventional disposable, and 354 to home-laundered cloth diapers. Objective measurements of skin wetness (transepidermal water loss) and skin pH, as well as double-blind grading of diaper dermatitis, were the measures of skin condition. Absorbent gelling material disposable diapers were associated with significantly reduced skin wetness, closer to normal skin pH, and lower degrees of diaper dermatitis when compared to conventional disposable or home-laundered cloth diapers. The results are consistent with the hypothesis that better control in the diaper area of skin wetness, skin pH, and the prevention of the mixing of urine and feces produces a better diaper environment.

ABSTRACT #11

CLINICAL TESTS WITH IMPROVED DISPOSABLE DIAPERS

Robert L. Campbell, Ph.D.
The Procter & Gamble Company, Cincinnati, Ohio
Diapering and Infant Skin Care. Proc. Int. Symp., Hakone 1986
Pediatrician 14: suppl. 1, 34-38, 1987

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Etiologic factors in the development of episodic diaper dermatitis include skin wetness and skin damage from fecal enzymes. In addition, when urine and feces mix, the activities of fecal enzymes increase as the pH rises from production of ammonia. An improved disposable diaper has been developed to provide better control of these factors by improved wetness and pH control. The improved diaper contains absorbent gelling materials (AGMs) blended into the diaper's cellulose core. AGMs are nontoxic, cross-linked polyacrylate polymers. They bind water tightly, give pH control by providing a buffering capacity, and in a diaper help to segregate urine and feces, thereby reducing the potential for increases in pH from ammonia production. To assess the effectiveness of this diaper, four 16-week clinical home-use tests were conducted with the AGM disposable versus conventional cellulose core disposable and home-laundered cloth diapers. Rigid group randomized stratification of infant maturity, diet, and initial level of diaper dermatitis provided control of factors other than the diaper that impact on development of diaper dermatitis. Skin wetness as measured by transepidermal water loss immediately after diaper removal, skin pH, and blinded visual evaluation of diaper dermatitis were used as skin condition measures. The use of AGM disposable diapers was associated with significantly reduced skin wetness and closer to normal skin pH as compared with the use of conventional disposable or home-laundered cloth diapers. Considered as an aggregate, the four clinical studies showed that AGM disposable diapers provide a better diaper environment and are associated with significantly lower degrees of diaper dermatitis than conventional disposable and home-laundered cloth diapers.

ABSTRACT #12

EFFECTS OF DIAPER TYPES ON DIAPER DERMATITIS ASSOCIATED WITH DIARRHEA AND ANTIBIOTIC USE IN CHILDREN IN DAY-CARE CENTERS

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Pediatric Dermatology 5 (2): 83-87, 1988

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Infants and toddlers in day-care centers have a relatively high frequency of diarrhea and/or oral antibiotic use, and may be at increased risk of developing diaper dermatitis when diapered. A six-month, prospective, double-blind study was conducted in day-care centers in Houston, Texas, to determine the frequency of diarrhea, antibiotic use, and diaper dermatitis in infants and toddlers wearing conventional (cellulose-only core) disposable diapers or disposable diapers with a core of absorbent gelling material (AGM) and cellulose. A questionnaire was administered weekly to the day-care staff to gather health information, and weekly visual examinations were made of children with diaper dermatitis. The frequency of diarrhea was 1.9 episodes per child-year and that of antibiotic use was 3.3 courses per child-year. Infants diapered in disposable diapers with AGM had a significantly ($P < 0.03$) lower mean grade of diaper dermatitis during diarrhea episodes and a lower ($P < 0.054$) mean grade during antibiotic use, compared to those diapered in conventional disposable diapers. There was no significant difference between groups with regard to isolation of *Staphylococcus aureus* or *Candida albicans* from superficial skin cultures of the diapered area. The results indicate that diarrhea and antibiotic use occur frequently in children in day-care centers, and that the severity of diaper dermatitis is less in children wearing AGM disposable diapers than those wearing conventional disposable diapers in that setting.

ABSTRACT #13

CLINICAL AND MICROBIAL EFFECTS OF CLOTH, CELLULOSE CORE, AND CELLULOSE CORE/ABSORBENT GEL DIAPERS IN ATOPIC DERMATITIS

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Diapering and Infant Skin Care. Proc. Int. Symp., Hakone 1986

Pediatrician, 14: supp. 1, 39-43, 1987

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Atopic dermatitis (AD) is an inherited cutaneous inflammatory condition which may affect 10% of infants. Persons with this diathesis are more susceptible to irritants and to superficial infections. Little is known about diaper rash and diapering materials in AD. In this study we set firm criteria to identify a large group of infants with AD for comparison with a nonatopic, normal control group in terms of (1) severity of diaper dermatitis; (2) relationship of diaper dermatitis to diaper materials; and (3) influence of modifying factors (bacterial and candidal colonization/infection, diarrhea, antibiotics, other illnesses, food allergy or intolerance). Babies with eczema were recruited and, from a group of 2,443 respondents, 87 satisfied carefully defined criteria for atopic dermatitis. A similarly sized (90) control group matched for age, sex, and weight was selected for absence of features of atopy or familial atopic history. Infants were assigned into balanced subgroups wearing cloth diapers, conventional cellulose diapers, or diapers containing cellulose and absorbent gelling material (AGM). Assessment of grading for atopic parameters showed statistically significant differences between the AD and normal groups at every visit. Mean diaper rash grades, as assessed by the same physicians at each visit, were significantly higher in the AD group wearing cloth diapers compared with those in AGM subgroups at five of eight visits. There was significant correlation between AD severity and diaper rash scores overall and in the AD cloth group, but not in other subgroups. Quantitative total bacterial plate counts were significantly lower in AGM than cloth diaper areas on three of eight sampling periods in the AD group. Surprisingly, samplings from inside and outside diaper areas showed *Staphylococcus aureus* colonization in only 65 and 20%, respectively, among AD subjects. Repeated isolation of *S. aureus* was characteristic of fewer than one third of the infants with AD. In assessing contributory factors for diaper rash, clearly the strongest was AD, followed by diarrhea and use of antibiotics.

ABSTRACT #14

CLINICAL EFFECTS OF DIAPER TYPES ON THE SKIN OF NORMAL INFANTS AND INFANTS WITH ATOPIC DERMATITIS

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J. Am. Acad. Dermatol 17: 988-997, 1987

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Cloth diapers, cellulose core diapers (conventional disposable diapers), and cellulose core diapers containing absorbent gelling material were examined for their effects on diaper rash and skin microbiology of normal infants and infants with atopic dermatitis in a 26-week double-blind clinical trial. Infants with atopic dermatitis wearing the diapers containing absorbent gelling material had significantly lower diaper rash grades than infants with atopic dermatitis wearing cloth diapers at five of eight grading visits. Infants with atopic dermatitis wearing conventional cellulose core diapers had statistically less rash at one of eight visits. There was no statistically significant difference between diaper types at three of the eight visits. At no time did the cloth group have less diaper rash than the conventional cellulose or absorbent gelling material disposable diaper group. A statistical correlation between the severity of general atopic dermatitis outside the diaper area and the diaper rash condition under the diaper occurred only in the atopic dermatitis group wearing cloth diapers. Isolation of microorganisms from the intact, uninvolved skin surface both inside and outside the diaper showed no biologically significant changes in the presence or numbers of selected skin organisms. Repeated isolation, at multiple grading visits of *Staphylococcus aureus* from uncompromised skin inside the diaper area was infrequent but correlated with the diagnosis of atopic dermatitis when observed.

ABSTRACT #15

DIAPER AREA SKIN MICROFLORA OF NORMAL CHILDREN AND CHILDREN WITH ATOPIC DERMATITIS

Bruce H. Keswick, Ph.D., Jon L. Seymour, Ph.D., and M. C. Milligan, M.B.A.

The Procter & Gamble Company, Cincinnati, Ohio

Journal of Clinical Microbiology 25 (2): 216-221, 1987

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In vitro studies established that neither cloth nor disposable diapers demonstrably contributed to the growth of *Escherichia coli*, *Proteus vulgaris*, *Staphylococcus aureus*, or *Candida albicans* when urine was present as a growth medium. In a clinical study of 166 children, the microbial skin flora of children with atopic dermatitis was compared with the flora of children with normal skin to determine the influence of diaper type. No biologically significant differences were detected between groups wearing disposable or cloth diapers in terms of frequency of isolation or log mean recovery of selected skin flora. Repeated isolation of *S. aureus* correlated with atopic dermatitis. The log mean recovery of *S. aureus* was higher in the atopic groups. The effects of each diaper type on skin microflora were equivalent in the normal and atopic populations.

**"Reducing Illness in Group
Child Care Settings -
The Role of Diapers"**

R. W. Berg

Procter & Gamble Company

**Oral Presentation at the Annual Meeting
of the National Association for the
Education of Young Children**

November 3, 1989

Atlanta, Georgia

REDUCING ILLNESS IN GROUP CHILD CARE SETTINGS:

THE ROLE OF DIAPERS

(NAEYC Presentation 11/3/89)

I am going to show you a videotape this morning that demonstrates the importance of diapers in providing a healthy environment for children in group care. The tape describes a study we conducted with two disposable diapers that differ in their ability to contain runny BM that might occur during an outbreak of diarrhea in a day care center. Following the videotape, I would like to briefly share the results of a similar study we conducted to compare a disposable single-use diaper and cloth diapers with plastic overpants.

<<< Show Tape >>>

After the study described in the videotape was complete, we conducted a clinical study in day care centers, comparing levels of fecal bacteria on environmental surfaces and hands of children and day care workers when the same two diapers were used, and we found consistently lower levels of contamination with the better-containing diaper. So, the results of the day care simulation study are consistent with an actual use study in day care centers, thus strengthening the connection between good containment and good health.

Cloth diapers are used for a variety of reasons by a small segment of the population, and we were interested to know how they would perform

in a similar study. So, we compared cloth diapers with plastic overpants and a version of diaper B, the better containment diaper, in a small pilot study that was designed to be more quantitative than the one I just showed you. This was accomplished by computer image analysis of floor segments under carefully controlled UV lighting conditions, in addition to subjective grading of diaper leakage. (Table 1) In this study, only 8%, or 1 of 12 of the disposable diapers leaked artificial BM, while 50% of the cloth diapers leaked. Not only were cloth diapers more likely to leak, but when they did, the leakage occurred to a much greater extent. On a 0-3 scale, the disposable leak scored a grade of 1, while the mean of the cloth group was a grade of 2.8. The disposables tended to look like this (children in non-leaking disposable diapers), while the cloth diapers tended to look like this (children in leaking cloth diapers)

This diaper leakage resulted in contamination of the room environment and the results of computer image analysis of the floor are shown here (Table 2). Use of disposable diapers resulted in significantly less contamination of the floor, and when contamination was present, it was significantly less concentrated. When toys were observed under UV light, no contamination was observed on those from the disposable diaper group, but as you might imagine, those from the cloth group looked like this (contaminated toy) or this (contaminated toy).

The message I want to leave with you this morning is that diaper containment is an important factor for promoting good health in group child care. Diapers that leak during diarrhea outbreaks result in

environmental contamination with enteric pathogens, leading to an increased risk of disease transmission. These data support the conclusion that cloth diapers are a poor choice for use in day care centers. While the elastic leg bands of plastic overpants probably can make the cloth diapering system fairly occlusive, diaper capacity and fluid binding are very important for preventing leakage of diarrheal BM. Disposable diapers, particularly those containing absorbent gelling material, have a fluid handling capacity that is many times that of cloth diapers. Once the limited fluid handling capacity of the cloth diaper is exceeded, liquid BM is free to leak from the diaper and contaminate the environment. Furthermore, the additional handling and storage of soiled diapers inherent to cloth use is likely to provide additional opportunities for the spread of enteric disease.

In conclusion, as the videotape pointed out, diapers that provide better BM containment offer an approach to improved health care that we call "passive intervention" - that is, unlike handwashing and other hygienic measures, no special actions are required. Use of disposable diapers therefore represents a positive and easily accomplished part of maintaining quality health care in day care centers.

R. W. Berg

10/25/89

REDUCING ILLNESS IN GROUP CHILD CARE SETTINGS:

THE ROLE OF DIAPERS

(Videotape Script 9/21/89)

Day care is a rapidly growing industry important to the changing lifestyle of our country. During the past 15 years, the number of working families with children less than one year old has doubled from 25% to 48%. In the next five years, this number is expected to increase again by 50%. Currently, there are approximately one million children under age 3 enrolled in organized child care facilities.

Day care brings children together who are susceptible to infection and disease. Diarrhea is a major illness among children in day care centers. Day care center children average 2.8 episodes per year, or about 30% more episodes than children cared for at home.

Microorganisms that cause diarrhea are spread from child to child by direct personal contact and from contamination of the day care center environment by fecal matter.

This diagram illustrates how the spread of fecal microorganisms occurs. From one ill child, the index case, other children pick up the microorganisms from environmental objects, from other children, or from day care personnel. The children become infected when they place their hands or shared objects into their mouths. As the number of ill children in the center increases, the opportunity for the spread of infection to other children and their families increases.

TABLE 1. BM leakage from disposable and cloth diapers.

=====

<u>Diaper Group</u>	<u>N</u>	<u>No. Leaking Diapers (%)</u>	<u>Mean Leakage Grade*</u>
Disposables	12	1 (8%)	1
Cloth	12	6 (50%)	2.8

=====

*Mean of diapers that leaked BM

TABLE 2. Contamination of Floor with Artificial BM

=====

<u>Diaper Group</u>	<u>Area Contaminated (%)</u>	<u>Mean Intensity of Contaminated Areas</u>
Disposables	0.11*	54*
Cloth	0.95	76

=====

*Significantly different from cloth group at $p < 0.05$ (Student's t)

This chain of infection results in increased direct health care costs, and even larger indirect costs associated with lost parental work time. Furthermore, there is ample evidence that infectious diseases may be spread from day care centers to individual home environments and to the community at large. The enteric disease transmission chain is not just a day care problem, but has links wherever diapered children interact with susceptible individuals.

Previous studies in day care centers have detected fecal bacteria at a significant frequency on objects like toys, furniture and hands of children and day care personnel. Data show increased contamination during outbreaks of diarrhea.

Medical experts believe that a reduction in fecal contamination of the day care center environment will lead to a reduction of diarrheal disease transmission. One way to accomplish this is through the use of diapers that are better able to contain runny BM. Diapers that reduce BM leakage therefore have the potential to reduce fecal contamination in day care centers and to disrupt the transmission of diarrheal disease.

The goal of the study described on this videotape was to provide a visual demonstration of diaper containment and how leakage can lead to contamination of the environment. While the focus here is on day care, the same hygienic benefits apply wherever one finds diapered children, including neighborhood play groups and family units.

We compared BM leakage from two disposable diapers differing in containment performance in a simulated day care center, by incorporating an ultraviolet visible brightener into an artificial BM added to the diapers. The children were diapered, and 50 milliliters of artificial BM containing the fluorescent compound were delivered into the back of the diaper using a calibrated pump. The children played in a simulated day care center environment for 45 minutes. Each child's legs and hands, as well as the room environment, were then photographed under ultraviolet light.

Percent of Diapers That Leaked BM

<u>Diaper A</u>		<u>Diaper B</u>	
<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
33/36	96	23/48	48

Following the play period, the percent of diapers that leaked BM was determined, and the data are shown here. The results show a 50% difference in containment performance between the two diapers. 33 out of 36, or 96% of the A diapers leaked, while only 23 out of 48, or 48% of diaper type B showed leakage.

The consequences of BM leakage can be seen in these pictures taken after 12 children wearing Diaper A loaded with artificial BM had played in the room for 45 minutes. Contamination by the

artificial BM, seen as light blue fluorescence, is visible on the floor, toys, chairs and other objects in the room. These pictures clearly support the model of disease transmission proposed earlier. Children playing in this environment are likely to pick up infectious organisms on their hands and become infected with them.

The next series of scenes demonstrate how BM leakage could contribute to the spread of disease-causing organisms in day care centers.

Here is a child on a riding toy that will be shared by other children. The artificial BM is leaking down the side of the toy as you will see under UV light.

Look at the condition of the toy when it was used by the other children. These kids had more than just the toy to share.

Watch the reaction of the child who finds the results of his leaky diaper on the floor in front of him...His hands are now contaminated.

Now look at the floor where he and other children have been playing, photographed under UV light. You can imagine how such contamination might lead to the spread of disease.

This child is having fun chewing on the toys he picks up off the floor. He is also nicely demonstrating how infectious organisms can be transferred from the environment to the mouth.

This is the area of the room where this child was sitting. Note the contamination on the floor in the foreground.

In this scene a child is playing on a riding toy. His diaper is leaking. Under UV light you can see the results. Now watch the children who play with the bike next. One puts the bike handle into his mouth and then thoroughly wipes his face after touching the seat of the bike. Another demonstration of hand to mouth transfer.

Next, watch the child on the right put the wooden block in his mouth. Under UV light we can see that the block was contaminated by artificial BM.

When Diaper A was used, the environment was heavily contaminated. Children playing in this room clearly had ample opportunity to pick up the contamination.

Now let's look at the difference that better containment makes. This is the simulated day care room after 12 children wearing Diaper B with artificial BM had played for 45 minutes. You can clearly see that this diaper leads to a cleaner environment. Less fluorescent material is present on the floors and toys as compared to what you saw before with Diaper A. A day care center environment with less contamination by fecal matter means there is less chance that children will pick up fecal bacteria on their hands or toys and become infected with disease-causing organisms. Better containment with Diaper B resulted in a cleaner day care environment.

In addition, children wearing Diaper B had cleaner hands. When children's hands were photographed under ultraviolet light, artificial BM was seen on the hands of 41% of the children wearing Diaper A, but only 6% of the children wearing Diaper B were contaminated. An example of hand contamination is shown here.

Contamination of Hands

<u>Diaper A</u>		<u>Diaper B</u>	
<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
14/34	41	3/48	6

So, we have seen that with better containment, both the environment and hands were less contaminated.

This videotape has provided a visual demonstration of the value of containment when diapers are used in group child care. You have seen how a day care center environment can become contaminated by BM that leaks from diapers and how this contamination can infect children by the oral route. While the disposable diapers used in this study differ in containment performance, all modern disposables have vastly superior absorbency and fluid handling characteristics relative to cloth diapers, which are probably a poor choice for group care situations. The traditional public health approach to disease control in day care centers has involved three key elements: Good handwashing practices, good house-cleaning practices, and segregation or exclusion of sick children. These approaches can be effective, but they all require continuous, conscientious training and actions -

actions that are all too easy to neglect in the busy day care environment. Diapers with superior BM containment offer the potential for effective passive intervention, and thus represent an important new approach to promoting good health for children in group care settings.

R. W. Berg

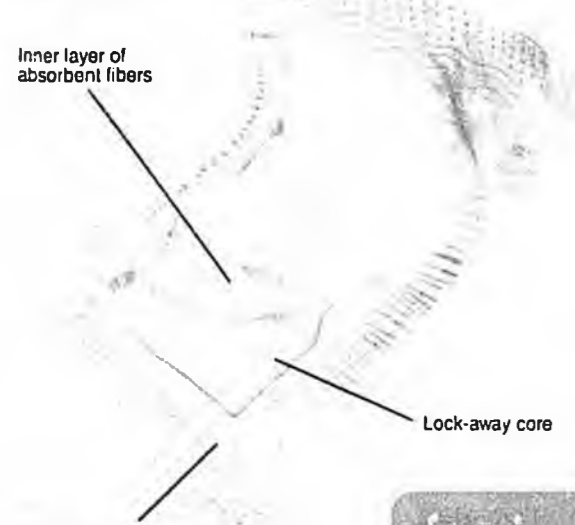
9/21/89

THE FOLLOWING DOCUMENT HAS
NOT BEEN FILMED BUT IS
AVAILABLE IN THE ORIGINAL
FILE

Questions 
& Answers 
About
Solid
Waste

How Ultra Pampers® Plus helps control irritating wetness

Ultra Pampers Plus has an inner layer that contains unique absorbent material that combines with urine to form a gel in the diaper's core. The irritating wetness that is locked away can't be squeezed back against your baby's skin or mix with stool.



Blue waistshield provides moisture-proof protection

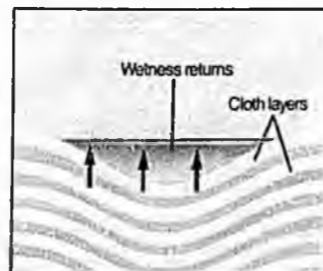


241-4358

Ultra Pampers® Plus versus other diapers

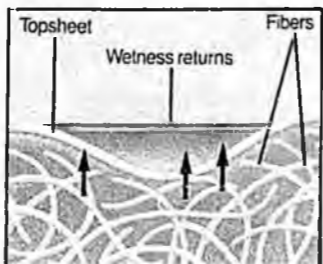
Cloth diapers hold wetness against skin

Cloth diapers' limited absorbency allows them to be readily saturated and hold urine against your baby's skin.



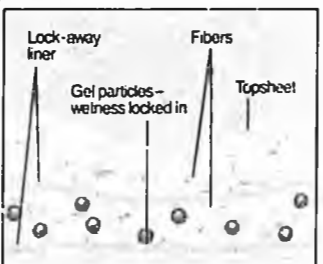
Conventional disposables let wetness squeeze back

Conventional disposables work like a sponge: Although urine is absorbed into the diaper, pressure from the baby's body can squeeze it back against skin and into contact with stool.



Ultra Pampers Plus helps lock wetness away from skin

The unique core of Ultra Pampers Plus has absorbent gelling material that combines with urine to help lock wetness away from the skin and stool.



What Ultra Pampers® Plus means for you and your baby

- New lock-away core for less leakage.
- Helps control wetness and skin pH, two factors important for maintaining healthy infant skin.
- Super-thin diaper snuggles up to your baby for comfort without bulk.
- Sure-fit tapes and special taping panel allow for easy refastening so that you can check your baby again and again.
- Dry Bear design provides an easy guide for an even fit.
- Blue waistshield helps stop leaking at the waist—even when baby is lying down.



PAQ-285

What every parent should know about

DIAPER RASH

- Who gets it?
- What causes it?
- What you as a parent can do about it.

Provided in the interest of better infant care by

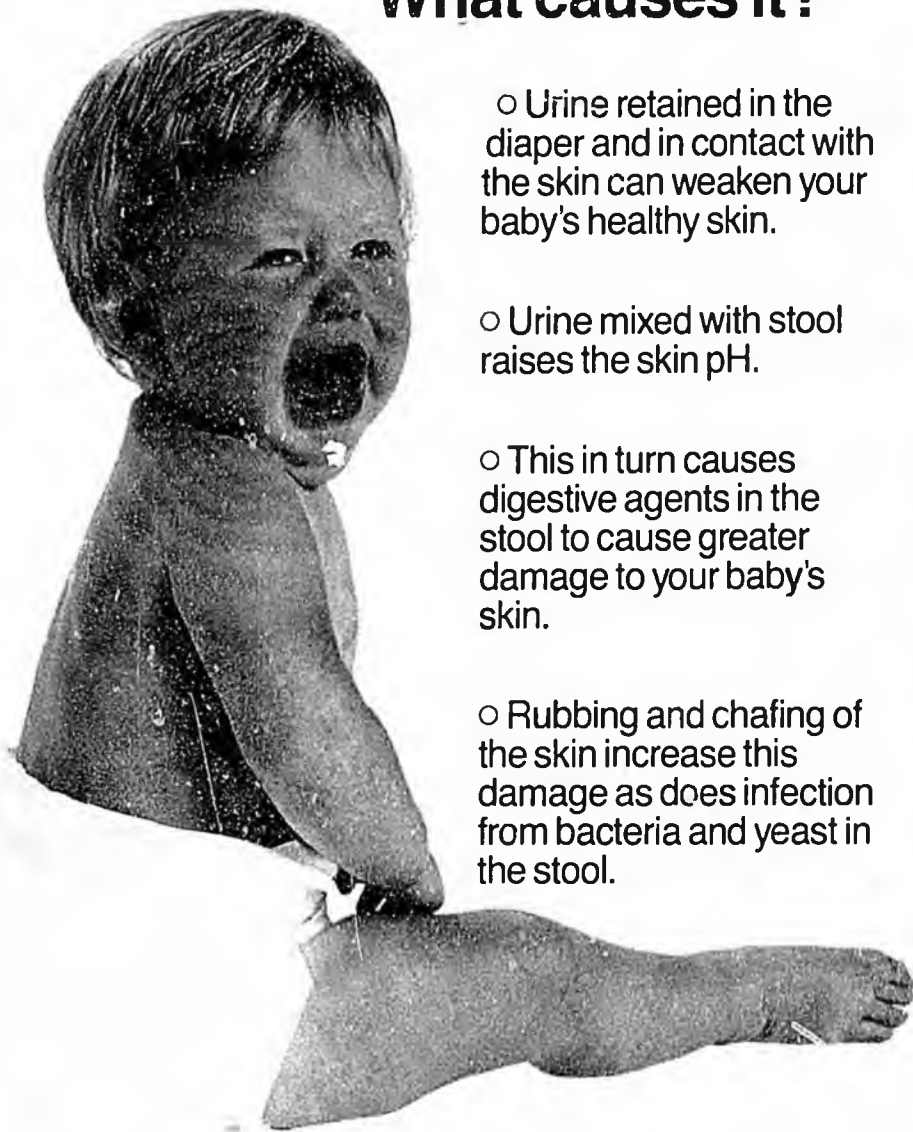
Ultra Pampers® Plus



DIAPER RASH

Who gets it?

- Approximately 30% of all babies have diaper rash at any given time.
- Babies between 8 and 10 months of age have the highest rate of diaper rash.
- Breastfed babies' stool is less irritating. Therefore, they have a lower incidence of diaper rash than bottlefed babies.
- Babies who have diarrhea experience more rash.
- Babies on certain antibiotics may experience more rash.



What causes it?

- Urine retained in the diaper and in contact with the skin can weaken your baby's healthy skin.
- Urine mixed with stool raises the skin pH.
- This in turn causes digestive agents in the stool to cause greater damage to your baby's skin.
- Rubbing and chafing of the skin increase this damage as does infection from bacteria and yeast in the stool.

New research confirms that the causes of diaper rash are complex.



Diaper rash rarely causes serious health consequences, but it may be uncomfortable for your baby and distressing for you as a parent.

How parents can help maintain healthy infant skin

- Keep your baby's skin clean and dry.
- Gently clean diaper area with water and cotton during changes, especially after a bowel movement.
- Don't allow your baby to stay in a wet or soiled diaper.
- Change diaper immediately after a bowel movement to avoid the mixing of urine and stool.
- Use a diaper with absorbent gelling material that helps lock wetness away from your baby's skin.
- If diaper rash develops and persists more than 48 to 72 hours, contact your health care professional.

S B

442

SENATE COMMITTEE REPORT
FIRST COMMITTEE OF REFERRAL

DATE: 2/7/90

FURTHER: Judiciary
Finance

Date of 5-Day Notice: 2/8/90
(in accordance with Uniform Rule 23)

DATE TURNED INTO OFFICE: 2/22/90

H E S S

Committee considered

SB 442

"An Act allowing a public or private school to adopt a policy authorizing the use of corporal correction."

and recommended:

replace with _____ CS SB 442 (HESS) same title
[] attached amendment(s) [] new title

[] _____ letter of intent adopted

[] do pass

[] do not pass

[] no recommendation

individual recommendations

[] further referral to _____

ATTACHES NEW FISCAL NOTE(S):

Department(s)/Date:

Department(s)/Date:

[] fiscal note(s) _____

zero fiscal note(s) _____
Dept. of Education

[] appropriation-no fiscal note

[] Governor's bill w/fiscal note

SIGNING DO PASS:

[Signature]
Tim Kelly

OTHER RECOMMENDATIONS:

Al Adams - No Rec

Paul Fresh (Do Pass)
Chair: Signature and Recommendation

FISCAL NOTE

REQUEST:

Revision Date: _____ Agency Affected: Education
 Title: Allowing a public or private BRU: _____
school to adopt a policy. . . corporal correction
 Sponsor: Coghill Components: _____
 Requestor: Senate HESS

EXPENDITURES/REVENUES: (Thousands of Dollars)

OPERATING	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96
PERSONAL SERVICES						
TRAVEL						
CONTRACTUAL						
SUPPLIES						
EQUIPMENT						
LAND & STRUCTURES						
GRANTS, CLAIMS						
MISCELLANEOUS						
TOTAL OPERATING	-0-	-0-	-0-	-0-	-0-	-0-

CAPITAL						
---------	--	--	--	--	--	--

REVENUE						
---------	--	--	--	--	--	--

FUNDING: (Thousands of Dollars)

GENERAL FUND	-0-	-0-	-0-	-0-	-0-	-0-
FEDERAL FUNDS						
OTHER						
TOTAL						

POSITIONS:

FULL-TIME						
PART-TIME						
TEMPORARY						

ANALYSIS : (Attach a separate page if necessary)

Changes in **CS5B442 (HESS)** have no fiscal impact. This fiscal note is appropriate. Projections of no fiscal impact would continue through 1996.

DCM-5-HESS

Prepared by: Mary Hakala
 Division: Commissioner's Office

Phone: 465-2800
 Date: 5/9/90

Approved by Commissioner: William G. Demmert
 Agency: Education

Date: 5/9/90

Distribution (by preparer):
 Legislative Finance
 Legislative Sponsor
 Requestor

FISCAL NOTE

REQUEST: _____

Revision Date: _____ Agency Affected: Education
 Title: Allowing a public or private BRU: _____
school to adopt a policy. . . corporal correction
 Sponsor: Coghill Components: _____
 Requestor: Senate HFSS

EXPENDITURES/REVENUES: (Thousands of Dollars)

OPERATING	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96
PERSONAL SERVICES						
TRAVEL						
CONTRACTUAL						
SUPPLIES						
EQUIPMENT						
LAND & STRUCTURES						
GRANTS, CLAIMS						
MISCELLANEOUS						
TOTAL OPERATING	-0-	-0-	-0-	-0-	-0-	-0-

CAPITAL						
---------	--	--	--	--	--	--

REVENUE						
---------	--	--	--	--	--	--

FUNDING: (Thousands of Dollars)

GENERAL FUND	-0-	-0-	-0-	-0-	-0-	-0-
FEDERAL FUNDS						
OTHER						
TOTAL						

POSITIONS:

FULL-TIME						
PART-TIME						
TEMPORARY						

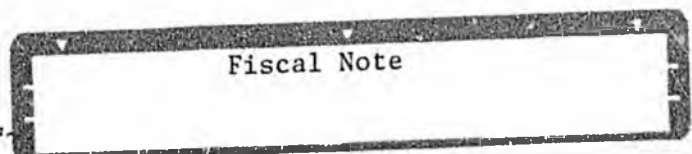
ANALYSIS : (Attach a separate page if necessary)

Prepared by: Mary Hakala Phone: 465-2800
 Division: Commissioner's Office Date: 5/9/90

Approved by Commissioner: William G. Demmert Date: 5/9/90
 Agency: Education

Distribution (by preparer):

- Legislative Finance
- Legislative Sponsor
- Requestor
- Office of Management and Budget



6-1899E✓
Ford
2/16/90

Original sponsor(s): SEN. COCHILL, Fischer

1 IN THE SENATE

2 CS FOR SENATE BILL NO. 442 (~~HESS~~)
3 IN THE LEGISLATURE OF THE STATE OF ALASKA
4 SIXTEENTH LEGISLATURE - SECOND SESSION

5 A BILL

6 For an Act entitled: "An Act allowing a public or private school to adopt
7 a policy authorizing the use of corporal correction."

8 BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

9 * Section 1. AS 14.30 is amended by adding a new section to read:

0 ARTICLE 9. CORPORAL CORRECTION.

1 Sec. 14.30.700. CORPORAL CORRECTION. The principal of a public
2 or private school, or a person employed by or contracting with a
3 public or private school who is authorized by the principal, may
4 impose or cause to be imposed corporal correction on a student if the
5 corporal correction is authorized under written guidelines adopted by
6 the governing body of the public or private school and is administered
7 in the presence of a parent, legal guardian, or person designated by
8 the parent or legal guardian. In this section, "corporal correction"
9 means the application of physical force for disciplinary purposes upon
10 a student who does not comply with the rules of the public or private
11 school.

22
23
24
25
26
27
28
29
*Any other
Time out
rooms*

Senator John B. (Jack) Coghill

Alaska State Legislature

Box V
Juneau, Alaska 99811
(907) 465-4797


Box 55028
North Pole, Alaska 99705
(907) 488-0862



MEMORANDUM

DATE: February 12, 1990

TO: Senator Paul Fischer, Chairman
Senate HESS Committee

FROM: Senator Jack Coghill 

SUBJECT: SB 442 Sponsor Statement

Senate Bill 442, "An Act allowing a public or private school to adopt a policy authorizing the use of corporal correction" is scheduled to be heard in your committee today.

As I'm sure you are aware, in June of 1989, the State Board of Education adopted regulations which affect all public and private schools in Alaska. These regulations take the authority to administer corporal correction away from the governing body of each school. They are in direct conflict with the separation of church and state, and with state law giving primary control to local school boards. Furthermore, AS 47.17 is our Child Protection Act. This Act protects children from physical injury that may result from disciplinary actions associated with school, home or any other child care environment.

I don't believe that the State Board of Education is staying within the education statutes (Title 14) which do not prohibit the use of corporal correction. We need to give this authority back to the governing body of each school where it belongs.

I appreciate you scheduling SB 442 to be heard in your committee in such a timely manner. Please give it your full consideration.

STATE OF ALASKA
THE LEGISLATURE

LEGISLATIVE AFFAIRS AGENCY

POUCH Y STATE CAPITAL
JUNEAU ALASKA 99811
907 455 3800

RECEIVED

MEMORANDUM

July 31, 1989

SUBJECT: Corporal punishment regulations
(Work Order No. 6-1550)

TO: Representative Peter Goll
Administrative Regulation Review Committee

FROM: Michael F. Ford *M.F.*
Legislative Counsel

You have asked if recent regulations adopted by the state Board of Education regarding corporal punishment are a proper exercise of the board's authority and if the regulations conflict with any other state law. As explained in this memo, I believe that the regulations are within the statutory authority of the state board, and do not conflict with existing state law.

1. Are the regulations a valid exercise of the board's authority?

Under AS 14.07.060 the state board is required to adopt regulations "necessary to carry out the provisions of" title 14. Regulations must be adopted under the Administrative Procedure Act (AS 44.62). Under AS 14.07.020, the Department of Education is required to exercise general supervision over public schools, and to impose by regulation, standards that will assure "healthful and safe conditions" in both public and private schools of the state. While it is arguable that corporal punishment is not a health issue, the state board did receive evidence of both the physical and psychological consequences of corporal punishment. It is also significant that the board has narrowly defined "corporal punishment" as physical force applied for disciplinary purposes. Finally, given the broad authority of the state board and the department over public schools the adoption of regulations prohibiting corporal punishment appears to be within the authority of the state board.

Leg. Legal Opinion

Representative Peter Goll
Page 2
July 31, 1989

Regarding private schools, under AS 14.45.100 the state board does have the authority to impose regulations that relate to physical health. The regulations do not prohibit corporal punishment in private schools, but merely require adoption of a written policy and specifies elements that the policy must contain. Again, while the relationship between health and discipline can be argued, the connection seems sufficient to justify the authority exercised by the state board.

2. Does the prohibition of corporal punishment conflict with AS 11.81.430 or any other state statute?

Under AS 11.81.430(a)(2), a teacher may use reasonable and appropriate nondeadly force upon a student, if authorized by school regulations. The use of force authorized under AS 11.81.430, relates to those instances in which the force would otherwise constitute an offense under Title 11. For example, physical force exercised by a teacher that might constitute a criminal assault is not a crime, if it is justified under AS 11.81.430(a)(2). Therefore, it appears that the purpose of this statute is to avoid criminalizing certain behavior and not to generally authorize the use of corporal punishment in public schools. Assuming that is true, then that purpose is not in conflict with regulations prohibiting corporal punishment adopted under Title 14. While not entirely clear, I believe that the justification provisions in AS 11.81.430(a)(2) do not authorize the use of corporal punishment, but are exceptions to what would otherwise be criminal behavior.

Aside from the language in AS 11.81.430, I cannot find any other state statute that would arguably relate to the corporal punishment regulations adopted by the state board.

I have enclosed additional materials relating to the regulations adopted by the state board, including a transcript of a public hearing on the issue. If you have further questions, please contact me.

MFF:gc:mi
G11/030

Enclosure

STATE OF ALASKA

DEPARTMENT OF EDUCATION

STEVE COWPER, GOVERNOR

GOLDBELT PLACE
801 WEST 10TH STREET
P.O. BOX F
JUNEAU, ALASKA 99811-0500

MEMORANDUM

State of Alaska
Department of Education

TO: Interested Parties

DATE: June 15, 1989

FILE NO:

TELEPHONE NO: 465-2800

Steve Hole
FROM: Steve Hole
Deputy Commissioner

SUBJECT: Corporal Punishment
Regulations

The State Board of Education on June 5, 1989 approved a regulation banning the use of corporal punishment in public schools. The board also approved a regulation requiring private schools that elect to administer corporal punishment to adopt policies governing its use.

The regulations approved by the Board are attached.

CORPORAL PUNISHMENT REGULATIONS
Alaska State Board of Education
Approved June 5, 1989

4 AAC 07.010 is amended by adding a new subsection to read:

(c) The use of corporal punishment in Alaska public schools is prohibited. (Eff. / / ; Register)

Authority: AS 14.07.020(a)(1)
AS 14.07.020(a)(2)
AS 14.07.020(a)(7)
AS 14.07.060

4 AAC 07.900 is adopted to read:

4 AAC 07.900. DEFINITIONS. As used in this chapter

(1) "corporal punishment" means the application of physical force to the body of a student for disciplinary purposes. It does not include the use of reasonable and necessary physical restraint on a student to protect the student or others from physical injury, to obtain possession of a weapon or other dangerous object from a student, to maintain reasonable order in the classroom or on school grounds or to protect property from serious damage or destruction.

(Eff. / / ; Register)

Authority: AS 14.07.020(a)(1)
AS 14.07.020(a)(2)
AS 14.07.020(a)(7)
AS 14.07.060

4 AAC 42.200 is adopted to read:

4 AAC 42.200. CORPORAL PUNISHMENT IN PRIVATE SCHOOLS. (a) Each private school that operates a pre-elementary, elementary, or secondary education program must adopt a written policy governing the use of corporal punishment, as that term is defined in 4 AAC 07.900. Unless the policy prohibits corporal punishment, it must

(1) describe the role of the person or persons authorized to administer corporal punishment;

(2) describe the circumstances under which corporal punishment may be used;

(3) describe the type and amount of corporal punishment permitted, including any instruments that may be used;

(4) describe any requirements governing privacy or the presence of witnesses; and

(5) require that parental consent must be obtained before corporal punishment is used. The consent may be given before each use of corporal punishment or a general consent for a period of time may be used.

Corporal Punishment Regulations

(b) The requirements of (a) of this section do not apply to a school in which only the children of a single family are enrolled, and the schooling is provided by the parent or legal guardian of the children.

(c) Each school required to have a policy under (a) and (b) of this section must distribute its current policy to the parents of each student and must have its current policy on file with the Alaska Department of Education, P.O. Box F, Juneau, Alaska 99811. Corporal punishment may be administered only in accordance with the policy on file with the department.

(d) Because it relates to the physical health of private school students, exempt schools under AS 14.45.100 -- 14.45.130 are not exempt from this regulation. (Eff. / / ; Register)

Authority: AS 14.07.020(a)(7)
AS 14.07.060
AS 14.45.100

P.O.Box 770029
Eagle River, Ak. 99577
Phone (907) 688-6888

May 22, 1989

Mr. Barney Gottstein, President
State Board of Education
P.O.Box F
Juneau, Ak. 99811

Dear Mr. President:

I have witnessed the violence and immoral behavior in the elementary, junior hi & high schools in Eagle River as late as 1988. As a grandparent, I urged my children to send their kids to a private school where that type behavior is not condoned or tolerated, and education has a priority.

Your proposed changes to the State Education Regulations on all forms of corporal punishment are unsatisfactory and unnecessary. These changes appear to be designed and motivated by some unstated agenda.

Let's get down to the basics. The public school system in Alaska is out of control. There is little, if any, protection for our children in school who become prey to violence inflicted by contemporaries, and there is little evidence that imparting knowledge(education) has any priority in the local schools.

Your problems in the school system are much more severe than corporal punishment and a make-work reporting scheme. You must look: get down in the trenches. Go see the overcrowded classroom, the teacher with an overload or the kid so stoned he/she bumps into walls and cars. How about the kid who can neither read nor write graduating from the Anchorage school system! Don't let someone tell you that these are isolated incidents. 'Tis more normal than unusual.

The worst part of this whole saga is that we, in the business community, are expected to hire these dysfunctional graduates. So, over, \$6300/student/year is spent and the product is flawed. What a crying shame!

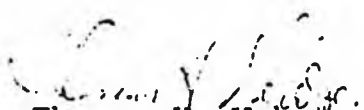
You are a man of many achievements and recognized as a leader in the business community. I, like you, recognize that 99.99% of all actions by a man are volitional: we always have

Letters of Support et.al.

in the regulation of the state education. I am very disappointed that you have failed to exercise leadership in a most trusted position: one that ultimately affects our children for the rest of their lives. You have had the opportunity to influence for good and failed. Thus, your many achievements pale in view of this most serious event.

Who really cares about a few spanked butts! Let's get down to the real issues. Hath education a priority in this state?

Sincerely,



Thomas H. Webster

cc
Senator Sam Cotten
Senator Rick Halford
Representative Randy Phillips
Governor Steve Cowper

Rolf W. Numme
8402 Decoy Blvd.
Juneau, AK 99801
May 23, 1989.

William G. Demmert, Commissioner
State of Alaska, Department of Education
P. O. Box F
Juneau, AK 99811-0500

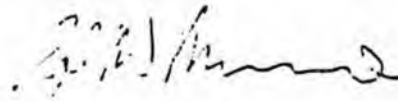
Dear Sir:

I am writing this letter in regards to the Department of Education's proposed regulations which would require private schools to submit a plan to the Department regarding our use of corporal punishment. As a concerned citizen who supports private Christian schools, I am strongly opposed to any regulations which would interfere with the maintaining of discipline within our schools.

As a Christian, I believe that corporal punishment, when used in conjunction with solid moral training which our schools provide, is very beneficial to the character development of a child. I believe that the church is an extension of the home and the school, an extension of the church and home. In short, values imparted in the school should be consistent with the values of the home and church.

The regulations which the Department is proposing, therefore, are a direct infringement on my basic constitutional rights. I brought my wife and family to Alaska six years ago because of the freedom which was available here in Alaska to set up schools in which we could teach our children the values consistent with our Christian faith. Therefore, I would encourage you and the Department to take this and the sentiments of other like-minded Christians into consideration.

Respectfully,



Rolf W. Numme

May 12, 1989
POB 526
Delta Junction
Alaska 99737

William G. Demmert
Commissioner
Department of Education
Goldbelt Place
801 West 10th Street
P.O. Box F
Juneau , Alaska
99811-0500

Reference: Memorandum 89-08 / Corporal Punishment

Dear Sir:

I am totally opposed to this proposed regulation of prohibiting corporal punishment in public schools and I am opposed to any attempt to regulate corporal correction in any private or 'denominational' school.

Parents are the God given authority over their children. If parents in a local community vote to enact this sort of legislation for their public school then so be it. I am opposed to a State Department dictating to a local community whether or not their children may receive corporal correction from their local public school. I am sure that parents who do not want their children corrected physically may simply inform the principal's office and their wishes would be fulfilled.

The regulation proposal to control corporal correction in private schools again preempts the parental authority over their children. Any parent who entrusts their children to the non-public sector has already counted the cost for this type of education and I am quite sure if they are not satisfied with the school policies they could either withdraw the student or as stated above insist that their child be exempted from corporal correction by the school staff.

I am alarmed that this sort of State control would be attempted here in Alaska. Our state was founded by independent men and women who traditionally valued the freedoms the forefathers of the United States of America bequeathed to its citizens. I see this type of regulation attempt as an affront to a parent's right to see that his children are raised in the manner that he wishes.

Sincerely,

Howard Echo-Hawk

cc: The Delta Paper
Fairbanks News Miner
Anchorage Daily Times
Anchorage News
Tok Mukluk News
Copper Valley Views
Copper Valley Country Journal
Nome Nugget
Juneau Daily Paper
Representative Dick Schultz
Senator Jack Coghill
Governor Cowper
Delta Public School Board

All Newspapers listed in the 89 milepost.

Senator John B. (Jack) Coghill
Alaska State Legislature

Box V
Juneau, Alaska 99811
(907) 465-4797

Box 55028
North Pole, Alaska 99705
(907) 488-0862



May 25, 1989

Commissioner William Demmert
Department of Education
P.O. Box F
Juneau, AK 99811

Dear Commissioner Demmert:

For the second time in two years, I would like to communicate my strong objections to your department's proposed regulations prohibiting corporal punishment in public and private schools.

These proposed regulations are an unnecessary intrusion of state government into the administrative policies established by local public school boards. They also represent an unconstitutional intrusion into the administration of schools with religious affiliations. I also believe there are serious implications for rural settlements where children are taught at home, by one or more of the available adults who may or may not be a parent or legal guardian to each of the children.

Contained in your "Notice of Proposed Changes in the Regulations of the State Board of Education" is the statement that this proposed action "is not expected to require an increased appropriation." I believe you have failed to consider the appropriation that would be necessary for the Department of Law to defend the unconstitutional relationship of this action with respect to private schools.

You have also neglected to recognize how the review of the private schools disciplinary policies and reporting requirements would be administered by your department staff, if these regulations are adopted. The implication is that if existing staff has the time to deal with the paper work these regulations will generate, there must be excess funds and personnel within your department's budget.

You will recall that the legislature has repeatedly considered banning corporal punishment in our schools. The legislation to accomplish this has repeatedly failed. These proposed regulations constitute an "end run" of the legislative process. The legislative intent of "physical health"

May 25, 1989

contained in AS 14.45.100 --14.45.130 does not encompass corporal punishment.

AS 47.17 was enacted in 1971 to specifically address the potential "harm" to children these proposed regulations appear to be concerned with. You will recall that AS 47.17 is our Child Protection Act. This Act more than adequately protects our school aged children from potential physical injury as a result of disciplinary actions, that may be associated with any school, home, or child care environment. To breach the constitutional division of church and state, or to breach the the relationship of the family with the state, in any manner other than those intrusions that presently exists, is clearly not within your departments administrative authority.

I strongly urge you to withdraw the proposed regulations concerning corporal punishment, contained in Memorandum Number 89-90.

It is clear to me that these regulations will only create a nightmare of paper work for both the private and home schools of this state, and for your agency. This added paper work serves no function other than to increase the cost of private and home education and they will eventually result in added nonfunctional costs of government. I find this sort of proposed regulatory action irresponsible to the needs our children's education.

Please consider all the ramifications your proposed regulation on this matter will have. I believe you will once again come to the same conclusion I have. Your most prudent decision is to withdraw the proposal.

Sincerely,



Senator John B. (Jack) Coghill

Alaska State Legislature

REPRESENTATIVE
MIKE W. MILLER
P.O. Box 55094
North Pole, Alaska 99705
(907) 488-2687

District 18
North Pole
Badger Road
Eielson
Moose Creek
Salcha

While in Juneau
P.O. Box V
Juneau, Alaska 99811
(907) 465-4976



House of Representatives

March 16, 1988

The Honorable William G. Demmert
Commissioner, Department
of Education
P.O. Box F
Juneau, Alaska 99811

Dear Commissioner:

As members of the Alaska State Legislature, we would like to register our objection to the regulation proposed in your departmental memorandum 88-14 which would prohibit the use of corporal punishment in all Alaskan schools.

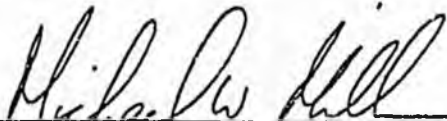
You are undoubtedly aware that legislation to ban the use of corporal punishment has been considered by the Legislature during the last three legislative sessions. Despite these attempts to institute a statewide ban, corporal punishment is currently permitted at the discretion of local school boards. We believe local school boards are the proper deliberative bodies to decide what type of discipline shall be administered in their respective school districts. We object to promulgation of regulations having the same effect as legislation which has repeatedly been denied passage.

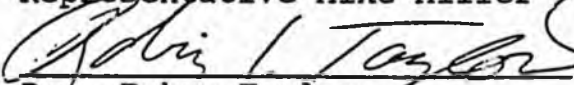
We would like to register our strong objection to the inclusion of private schools in the proposed regulation. In a joint meeting of the House and Senate Health, Education and Social Services Committees, which took place on March 6, 1986, extensive testimony was taken on Senate Bill 282 and House Bill 480. Testimony at this hearing indicated extensive public support for the right of parents to enroll their children in private educational programs which embraced more rigorous curriculum and disciplinary standards than most public schools. The testimony highlighted the fact that the private schools across the state were successful in obtaining deregulation of their programs in 1984 and suddenly legislation was under consideration which would begin to re-regulate them. We believe this argument is still valid and take exception to the inclusion of private schools in the proposed regulation.

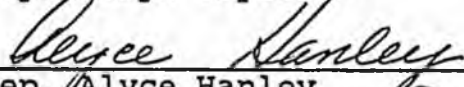
Commissioner Demmert
March 16, 1988
Page 2

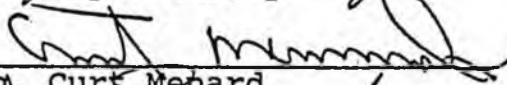
Commissioner, we respectfully request that the Department of Education withdraw the corporal punishment regulations proposed in its memorandum number 88-14 dated February 22, 1988.

Sincerely,

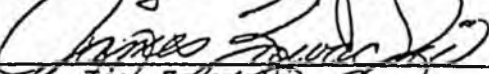

Representative Mike Miller



Rep. Robyn Taylor

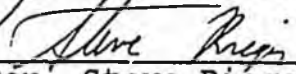

Rep. Alyce Hanley

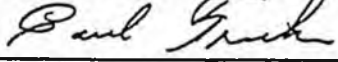

Rep. Curt Mehard


Rep. Fritz Pettyjohn

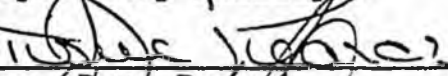

Rep. Jim Zawacki

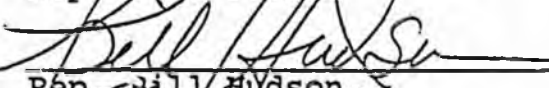

Rep. Virginia Collins

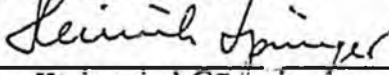

Rep. Steve Rieger

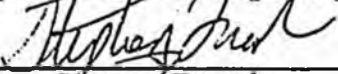

Senator Paul Fischer


Rep. Randy Phillips

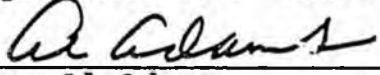

Rep. Drue Pearce

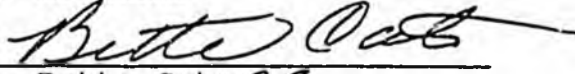

Rep. Bill Hudson

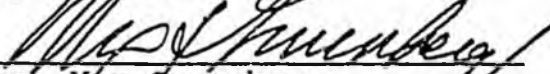

Rep. Heinrich Springer


Rep. Steve Frank


Rep. H.A. "Red" Boucher


Rep. Al Adams


Rep. Bette Cato


Rep. Max Gruenberg