Tabled Document 60-12(3)

KEEWATIN REGIONAL HEALTH BOARD

REPORT ON THE

1991 EPIDEMIC OF

E. COLI O157:H7 GASTROENTERITIS

IN THE KEEWATIN

ᑭᕙᓪᓕᐅᑉ ᐊᓐᓂᐊᖅᑕᐃᓕᓕᕆᔨᑯᑦ ᑲᑎᖅᒪᔨᖅᒥᑦ

NWT GOVERNMENT LIBRARY
3 1936 00020 198 6

© Keewatin Regional Health Board 1992

Printed in Canada by the Keewatin Regional Health Board,
Michelle Oram, Publisher

Keewatin Regional Health Board Report on the 1991 Outbreak of
E. coli 0157:H7 Gastroenteritis in the Keewatin

AUTHORS

R. Kielly CPHI(C), Keewatin Regional Health Board;

B. Lorencz RN BNSc MNSc, W. Murphy RN BN, O. Anoee CHR,
Arviat Health Centre;

Interagency Committee, Arviat;

P.H. Orr M.D. FRCPC, Infectious Disease Consultant;

D. Holton M.D. FRCPC, B. Tan M.D. FRCPC, J. Spika M.D.,

J. Hockin M.D. M.Sc., Laboratory Centre for Disease Control;

M. Crown, Health Promotion, GNWT Department of Health;

E. Orrbine, Canadian Paediatric Kidney Disease Reference Centre.

OTHER CONTRIBUTORS

R. Brown RN BN, B.K. Peterkin Ph.D, Keewatin Regional Health Board;

Hamlet Council, Health Committee, Hamlet of Arviat;

Leslie Knight RN, GNWT Department of Health;

S. Macdonald M.D. FRCPC, J.A. Hildes Northern Medical Unit.

EDITED BY

E. Busse B.Sc.N. MHA, Peace Arch District Hospital;

R. Brown RN BN, B.K. Peterkin Ph.D, Keewatin Regional Health Board.

COMPILED BY

Robert Kielly, CPHI(C), Sr. Environmental Health Officer,
Keewatin Regional Health Board

SECTION I

Keewatin Regional Health Board

Name	Community	Position
Mrs. Elizebeth Palfrey	Rankin Inlet	Chairperson
Mrs. Levinia Brown	Rankin Inlet	Vice-Chairperson
Mrs. Rebecca Kudloo	Baker Lake	Trustee
Mr. Anthyme Kadjuk	Chesterfield Inlet	Trustee
Mrs. Potogok Adamie	Coral Harbour	Trustee
Mrs. Elizabeth Ivalutanur	Repulse Bay	Trustee
Mrs. Mina Inuktaluk	Sanikiluaq	Trustee
Mrs. Eva Voisey	Whale Cove	Trustee
Mrs. Caroline Anawak	Rankin Inlet	Member at Large
Mr. John Kaunak	Repulse Bay	Trustee
Mrs. Rosie Oolooyuk	Rankin Inlet	Trustee
Mr. Paul Levielle	Churchill Health Centre	Trustee
Vacant	Arviat	Trustee

** The efforts of the Health Board Trustees at the time of the epidemic were instrumental in the eventual resolution of the incident. Many people took the time and effort to participate in phone in radio shows, answer questions from the general public, help disseminate control information and provide valuable assistance wherever possible. The extra effort during the time of crisis was certainly appreciated.

PREFACE

This report is the result of 1½ years of work by the Keewatin Regional Health Board on the 1991 epidemic of E. coli O157:H7 which was centred in Arviat, Northwest Territories. Many local, territorial and national groups and agencies have contributed significantly to the development of this document. Many individuals have also provided a great deal of help. This bringing together of such a wide variety of groups and individuals from very diverse backgrounds has allowed for a very comprehensive and educational document.

The Keewatin Regional Health Board is mandated to provide the people of the Keewatin with health care services. An important aspect of this mandate is the sharing of knowledge and information in an effort to improve the health of people within the Region. This document is another step in helping us to attain our goal of improving health care delivery for Keewatin Region residents.

INTRODUCTION

This report was prepared by the Keewatin Regional Health Board in order to provide a comprehensive overview of the E. coli O157:H7 gastroenteritis outbreak which occurred in the Keewatin Region between June and October, 1991. The report attempts to bring together the activities, concerns and suggestions of a wide variety of people and organizations including the community groups and the various health professionals who were involved in the investigation and containment of this disease outbreak.

A total of 521 cases of gastroenteritis were recorded during the course of this epidemic. This is the largest incidence of gastroenteritis attributable to E. coli O157:H7 documented in the world to date.

In the compilation of this report expertise was solicited from a wide variety of individuals and groups. Individual reports contained herein were written at different times during the course of the epidemic, therefore statistics may at times appear inconsistent. It is our opinion that the involvement of a wide range of experts from very divergent backgrounds coupled with organizations and individuals based in various communities, allowed for a unique learning opportunity for health care providers and for the Keewatin communities as a whole. The free exchange of information and ideas has enabled us to make recommendations which take into consideration the needs of the communities as well as the needs of the service providers.

It is the Health Board's sincere hope that recommendations emanating from this report will provide the basis for changes in the handling of future communicable disease outbreaks both in the Keewatin and across the Northwest Territories.

ACKNOWLEDGEMENTS

The Keewatin Regional Health Board (KRHB) would like to take this opportunity to thank those people and organizations who were involved in the containment efforts during the E. coli O157:H7 epidemic. This type of disease outbreak had never before been seen in the Keewatin or anywhere else in North America in such epidemic proportions. The manner in which many groups and individuals worked together to investigate the cause and control this disease outbreak gave a very good indication of the way in which people will, if necessary, develop strong linkages for the pooling of resources to solve difficult problems.

The people of Arviat deserve particular mention. Throughout the epidemic Arviat residents were constantly bombarded with new information and new requirements to help control disease spread. Participation in health promotion campaigns and cooperation by affected families and individuals was phenomenal. The type of response seen from residents was far greater than is the norm in Southern communities and is perhaps indicative of the closeness of people in Arviat and of their willingness to work together.

Local agencies in Arviat, including the Hamlet Council, Health Committee and Interagency Committee were also crucial in providing advice and assistance in getting the prevention message out to the community. The Arviat Hamlet Council in particular deserves special mention for their willingness to make some very difficult decisions, even when these decisions would not always be popular and would result in some community criticism.

The Arviat Health Centre Staff were exceptional in the care they provided to patients throughout the epidemic. Dozens of people were coming to the Health Centre for treatment and assessment daily. The professional manner in which the Nursing Staff approached the problems presented was critical in controlling the spread of the disease and alleviating community fears. The long hours worked, the professional approach and the caring attitude exhibited by the Arviat Health Centre Staff over the very difficult summer and fall of 1991 can not be overstated. We are thankful to them all.

Obed Anoee, Community Health Representative (CHR) in Arviat, deserves particular mention. Obed had just arrived from Yellowknife, following the completion of CHR training, at the time of the epidemic. His hard work, good humour and willingness to be proactive was critical in helping to control the spread of the epidemic. Without Obed's assistance and advice, many of the health professionals from outside of Arviat would not have been able to effectively conduct investigative and preventative procedures within an appropriate Inuit cultural context.

Health Centre Staff in all of the Keewatin communities were very active during the course of the epidemic in conducting local health promotion campaigns to try and prevent the spread of the epidemic to their communities. Their work in monitoring diarrhoeal presentations and in taking appropriate actions to prevent further spread of the epidemic was very important to the containment effort.

Dr. Pam Orr, with her training in infectious disease management, was contracted by the KRHB to provide on site Medical Health Officer services in Arviat. She was available to the

people of Arviat and the KRHB staff. Dr. Orr's calm and direct approach helped a great deal in allaying community concerns and answering important questions. Her contribution was invaluable.

Dr. Lisa Lugtig also provided crucial assistance by compiling the data on diarrhoeal presentations and laboratory results on the Epi Info computer program. This information was absolutely essential to several of the investigative bodies.

The Keewatin Regional Health Board would like to take this opportunity to thank the Staff at KRHB Regional Headquarters in Rankin Inlet. In particular, Rosemary Brown, Regional Nursing Officer, Robert Kielly, Senior Environmental Health Officer and Bruce Peterkin, Executive Director, worked many long hours on containment, organization and coordinating efforts during the course of the epidemic. Pauline Tan-McNeill and Adele Dyall, Senior Nursing Officers, were also instrumental in ensuring that staffing levels were maintained in Arviat and throughout the Region during the course of the epidemic. A strong team approach, which proved very effective, was evident in the Regional Headquarters Staff's handling of the epidemic containment and investigation processes.

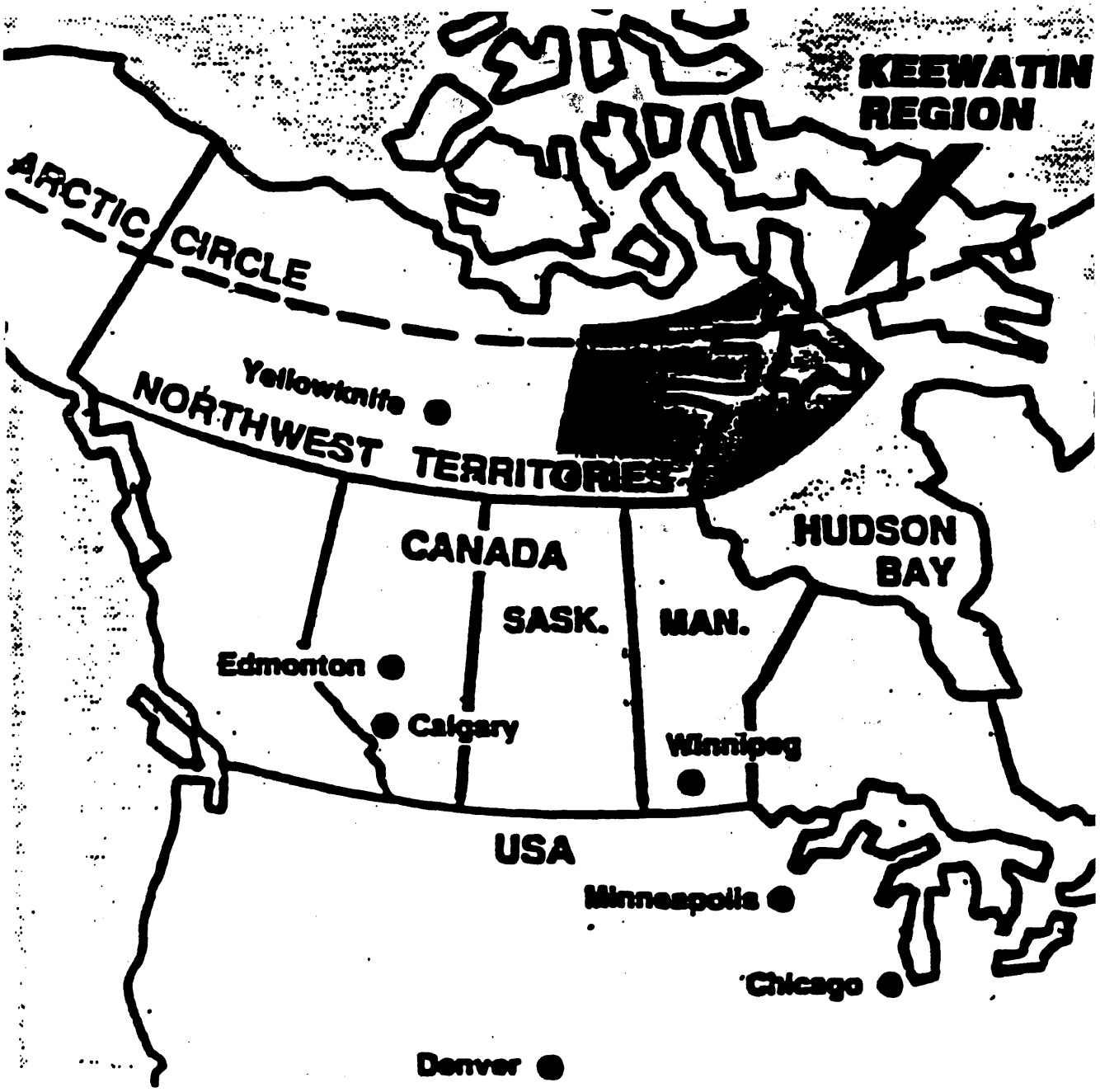
Former Ministers of Health, the Honourable Nellie Cournoyea and the Honourable Tony Whitford, both of whom were Ministers during different stages of the epidemic and its review, were instrumental in providing the necessary support to investigate the outbreak, institute control measures and conduct the reviews. Their help was indispensable.

Many organizations were very important and helpful in their direct, onsite roles during

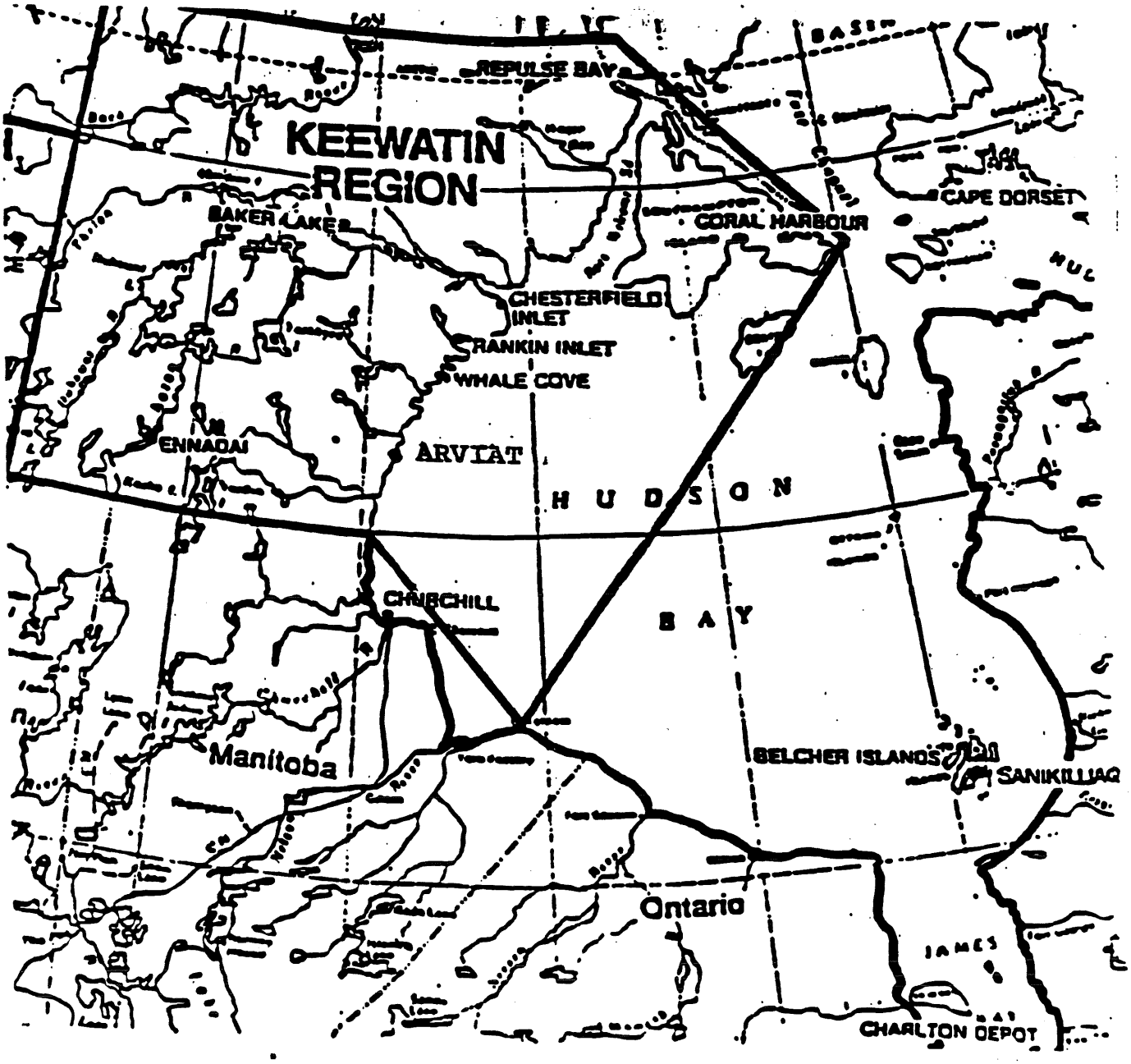
the epidemic and "behind the scenes". These groups include the Churchill Health Centre, Churchill, Manitoba; the GNWT Department of Health, particularly the Divisions of Environmental Health and Health Promotions for their assistance in the containment efforts; the Laboratory Centre for Disease Control, Ottawa; the University of Manitoba J.A. Hildes Northern Medical Unit, Winnipeg; the Cadham Provincial Laboratory, Winnipeg; and the Canadian Paediatric Kidney Disease Reference Centre, Ottawa.

The Regional broadcast media (radio) also played a very important role in the disease containment efforts. They provided local updates on the epidemic and hosted Regional phone-in shows. Their assistance was greatly appreciated.

There were other groups and organizations who played important roles in the epidemic investigation process. Thank you all for your advice, help and support. It is hoped that the lessons learned from the involvement of such a diverse group will go a long way in helping to develop effective measures for dealing with future communicable disease outbreaks in the Northwest Territories.



- This map illustrates the size of the Keewatin Region in comparison to the rest of Canada. Including Sanikiluaq, this huge area has a population of only 6,360 people according to the 1991 census.



- This map shows all of the Keewatin Region communities. Sanikiluaq, located on the Belcher Islands in the bottom right of the map, is also part of the Keewatin Region for Health Services Delivery.

TABLE OF CONTENTS

SECTION II

OUTCOMES

CHAPTER 1

OUTBREAK SYNOPSIS

Prepared by: *Robert Kielly*, CPHI(C)

Sr. Environmental Health Officer

Keewatin Regional Health Board

In order to provide the reader with a clear picture of E. coli O157:H7 gastroenteritis, its causes, symptoms and treatment, this synopsis will begin with a clinical update prepared by Doctors Orr and Tan and extracted from the Report by P.H. Orr, M.D FRCPC.

"E.coli O157:H7 is a bacteria that can cause diarrhoea in humans. It has been known to cause outbreaks among children and the elderly. In most instances, the illness is mild, consisting of watery diarrhoea (which may have blood streaks or frank blood!), abdominal cramps, nausea and vomiting and mild fever. The symptoms may last upward of 5-14 days in adults, but usually shorter in children (3-9 days). Please note that this infection can occur in people of ALL ages, but seems to cluster in the very young and the very old. The illness is more common in the summer.

While other serotypes of E.coli are commonly found in the gastrointestinal tract of normal humans, this particular strain (O157:H7) is not usually found except in association with diarrhoeal illness. The O-number refers to the specific protein type on the bacterial cell wall, while the H-number refers to the protein type of the tail or flagella of the bacteria. This strain is known to produce two toxins called "verotoxins". Many experts consider these toxins to be the cause of the diarrhoea and the complication that is sometimes seen with this infection.

The organism is found in various foods, including beef, lamb, pork, poultry, unpasteurized milk and cheese and in contaminated water. It can be ingested through food or by the faecal-oral route through contact with persons who are excreting the organism. The latter occurs mostly through touching the hands (or diapers in the case of babies) of infected

individuals who have not washed after using the washroom. We are unsure how long the organism can live on the surfaces or wet objects such as towels; likely it can survive for minutes or hours. The organism is more likely to survive outside the body in warm moist environments. Saliva is not thought to be infective.

After ingesting the organism, it multiplies in the GI tract and produces toxins which cause diarrhoea. The incubation period is 3-8 days. It is possible that some individuals become infected but do not become ill. We do not know how often or why this occurs. Studies have shown that such people are asymptomatic and carry the organism in their stool. However most infected persons do become ill. They excrete the most bacteria and are most infective while they have diarrhoea. We do not know how long they continue to excrete the organism. For the purposes of this outbreak we are stopping "voluntary isolation" after a person has been free from diarrhoea for 3 days.

At least 1% of cattle herds are infected with this organism. During the slaughtering of cattle, the organism in the cow's GI tract can get on meat. If the organism is on the surface of the meat product such as steak, it will be killed by cooking the surface even though the interior may be pink. However in hamburger the organism is usually distributed throughout the meat which then must be cooked in entirety.

We do not now if caribou also are infected. So far our studies of caribou meat, caribou faeces, seal, char and goose are inconclusive. Two samples of caribou meat were positive but they may have been contaminated by people touching the meat. The organism can survive freezing. It is killed by microwaving food provided the package microwaving instructions are

followed.

There is no specific treatment, vaccine or cure for this infection. There is some evidence that antibiotics may make it worse, so they are contra-indicated. In particular, Septra/Bactrim may increase the production of toxin by the bacteria. Anti-motility drugs (such a Buscopan, Lomotil, Donnagel, Kaopectate) may also worsen the illness. Hydration should be monitored.

The diagnosis is made by either culturing the organism and/or detecting the toxin in stool. The specimen should be kept cool and sent to the lab as soon as possible. Since this infection can have significant complications, it is important to make a diagnosis. In the setting of an outbreak, all diarrhoeal illness should be treated as possible cases. Bloody diarrhoea is probably E. coli O157, but we have seen many (50%) positive stools that were not bloody.

It is estimated that between 5-10% of persons with this infection may develop a condition called the "haemolytic uraemic syndrome" (HUS). This typically arises about 6-7 day after the onset of the diarrhoea, but can be seen as early as the 2nd to 3rd day and as late as two weeks after the appearance of diarrhoea. It is important to remember that in some patients HUS arises AFTER the diarrhoea has resolved. It is thought that the toxins pass into the bloodstream and cause vasculitis (inflammation of blood vessels) in the kidney, GI tract, heart, brain, liver, spleen and other organs.

Typically the patient becomes lethargic or less active. There may be a history of poor urine output. The patient may appear pale and mildly jaundiced because of haemolytic anaemia. Children may develop bruises or petechiae on their extremities because of associated

thrombocytopenia. In a few rare instances the patient may develop seizures. Finally in extreme situations, the patient develops acute renal failure and will need dialysis to sustain life. It is clear then that this syndrome, albeit uncommon, should be recognized quickly and the child transferred to a tertiary centre in the event that further treatment and dialysis are necessary. NOTE: The patient has FULL spectrum HUS if he/she has the triad of haemolytic anaemia, thrombocytopenia and renal failure. Some patients do not develop the whole picture, perhaps with very mild anaemia and thrombocytopenia but no renal failure. Others develop all three features but of VERY SHORT duration only. However a few develop the triad very rapidly and require extensive and prolonged treatment, eg dialysis over several weeks. There is no way to predict which course will be followed."

Between June and October of 1991 there were 521 cases of diarrhoea in the Keewatin. Of these cases, 151 were confirmed positive for E. coli O157:H7 and 22 individuals developed haemolytic uraemic syndrome. There were two deaths as a result of HUS. The community of Arviat was the most severely affected with a total of 319 diarrhoeal cases and 134 confirmed cases of E. coli O157:H7. This outbreak was the largest epidemic of gastroenteritis attributable to E. coli O157:H7 ever documented. It is also unique in that person to person spread appears to have been the primary mode of transmission.

A massive investigation and public health education/prevention campaign was launched in the Keewatin in an attempt to find the cause/source of the E. coli O157:H7 and to prevent the spread of the disease. Groups involved included the Hamlet Councils; Health Committees

and Interagency groups in Keewatin communities; the local radio media; the Keewatin Regional Health Board; the Government of the Northwest Territories' Department of Health, Yellowknife; the J.A. Hildes Northern Medical Unit, Winnipeg; the Cadham Provincial Laboratory, Winnipeg; the Laboratory Centre for Disease Control (LCDC), Ottawa; and the Canadian Paediatric Kidney Disease Reference Centre, Ottawa.

As the epidemic progressed, it was agreed that a complete review of the processes and actions that occurred during the outbreak should take place after it was over so that the community of Arviat could have any unanswered questions resolved and so the lessons learned during the investigation and control of the disease would not be lost. As a result, a community review was undertaken in May of 1992 in the community of Arviat, followed by a technical review in Rankin Inlet. The reviews were initially scheduled for January, 1992, however GNWT fiscal restraints required waiting until the new fiscal year. The review process proved to be very beneficial with constructive suggestions emanating from both the community and technical portions.

A detailed discussion of the various processes mentioned in this synopsis occurs in subsequent chapters.

CHAPTER 2

RECOMMENDATIONS

Prepared by: ***Robert Kielly*, CPHI(C)**

Sr. Environmental Health Officer

Keewatin Regional Health Board

It was the strong feeling of all those who were involved in the review process that this exercise **must not** culminate in a static report. In order to satisfy this requirement, each recommendation has been assigned to a particular group or individual for action. All those involved feel that it is mandatory to conduct a further review of the recommendations at a later date to ensure that appropriate action is being taken. As a result, it was recommended that a review of action taken on the recommendations be conducted in early November, 1992, which is six months after the initial review date.

The following is a list of the recommendations followed by the action to be taken and a brief explanation of how each recommendation came about. It should be noted that these recommendations emanate directly from both the community and technical review processes and were agreed upon by the participants in the technical review.

RECOMMENDATION #1

When an outbreak of a communicable disease is identified in a community, a local community coordinator needs to be identified to assist in dealing with outbreak control and agency interaction at the community level. It is imperative that Hamlet Councils and other concerned groups in the community be made fully aware of the situation and be made full partners in the disease control effort as soon as possible.

ACTION: Health Promotion Section, GNWT Dept. of Health, offered to provide a list of candidates for community coordinator positions in case of future communicable disease outbreaks. It is recognized that each outbreak situation is unique, as is each community, and

the coordinator position would therefore have to vary according to the community and type of outbreak in question. The Keewatin Regional Health Board will endeavour to appoint a community coordinator in future outbreak situations. KRHB will also ensure that Hamlet Councils and other concerned groups are made aware of circumstances as they unfold in an outbreak situation and will attempt to involve these groups in the disease containment efforts as early as possible.

EXPLANATION: Several individuals at the community review expressed concerns over the apparent lack of local input in Arviat during the course of the disease investigation. Information was coming in very rapidly and Health Professionals were coming in and out of the community just as rapidly. Health Centre personnel and Hamlet Council representatives were quite often overwhelmed with the amount of information, treating ill people and conducting other activities. It was felt that the provision of a locally hired community coordinator would alleviate confusion and help to gain better understanding between the community and the Health Professionals. During discussions at the technical review, the Health Promotion Section, Dept. of Health, indicated that they have a list of possible resource people available who might be able to fill this need in future disease outbreak situations. It was recognized that each community is different and that the community coordinator hired might be a different person depending on the type of disease outbreak and the community involved. For example, the CHR could not be designated as a community coordinator for all outbreaks, as their services might be required in educational campaigns or elsewhere, even though they might be well qualified for this position in certain situations. Several groups and individuals expressed the desire to be involved in the disease

containment efforts as soon as possible. The KRHB agreed that keeping local agencies informed and involving them in containment efforts is critical in effective outbreak management.

RECOMMENDATION #2

Discussion must ensue between the Department of Health and the Regions to identify roles and responsibilities during a disease outbreak. This would include the identification of the person responsible for the coordination of the outbreak containment activities and the identification of the individual responsible for designating a disease occurrence as an outbreak and officially announcing the end of an outbreak.

ACTION: The Chief Medical Health Officer will hold discussions with the Regions to clearly define roles and responsibilities in an outbreak situation.

EXPLANATION: During both the community and technical portions of the review, questions were raised and concerns were expressed over the lack of one distinct "person in charge" for the containment efforts and for making decisions such as when an outbreak should be deemed an epidemic and when an epidemic should be deemed concluded. Clear policies on these issues need to be identified and adopted on a Northwest Territories wide basis. Many people felt that a Medical Officer of Health located in the Keewatin would be able to solve this problem, however, a clear delineation of responsibilities between the GNWT Department of Health and the Keewatin Regional Health Board would still be necessary.

RECOMMENDATION #3

Resources must be made available, both human and financial, to allow Regions to

effectively address epidemic situations. This must allow for some freedom on a Regional level to fund specific community based programs as required.

ACTION: The Medical Directorate, GNWT Department of Health will draft a contingency plan for circulation that will address both human and financial resource allocation in an outbreak situation.

EXPLANATION: During the technical review, questions were raised about the current financial system which does not allow any flexibility for dealing with outbreak situations. Questions about funding local activities were also raised at the community review. The Regions do not have the budget lines for activities such as hiring local coordinators or funding special projects. If Regions are to adequately investigate and contain future disease outbreaks, they must have access to a central fund set up specifically to deal with extraordinary occurrences.

RECOMMENDATION #4

Given the extreme amount of stress involved in an epidemic, it is felt that a review of the outbreak should occur as soon as possible following the conclusion of the outbreak. For the community review this should be within two months of the conclusion of the outbreak and as soon as all pertinent data is available for the technical portion of the review.

ACTION: The KRHB and the GNWT Department of Health will adopt this recommendation as policy for future outbreak situations.

EXPLANATION: Given the positive feedback at both the community and technical portions of the review, it was felt that a review of the management of an outbreak should be a standard

part of the containment process. It is imperative that these reviews be held as soon as possible after the conclusion of the outbreak so that stress can be diffused, valuable information is not lost and insights may be gained for handling similar situations in the future.

RECOMMENDATION #5

It is recommended that a dedicated Public Health Nurse be permanently assigned to each of the communities of Arviat, Baker Lake and Rankin Inlet.

ACTION: The KRHB will forward this recommendation to the Minister of Health.

EXPLANATION: Given the current clinical load in the Health Centres in Arviat, Rankin Inlet and Baker Lake, very little time is left for preventative efforts. As a result, it is strongly recommended that a Public Health Nurse be assigned in each of the three aforementioned communities. These positions were created for a brief period of time during the outbreaks, however, the outbreaks themselves underlined the need for permanently establishing these positions.

RECOMMENDATION #6

It is recommended that a second Environmental Health Officer position be permanently allocated to the Keewatin Region.

ACTION: The KRHB will forward this recommendation to the Minister of Health.

EXPLANATION: As with Public Health Nursing, an improvement in the frequency of delivery of Environmental Health programs in the Region was seen as another way to improve the overall health of the population. The communicable disease outbreaks of 1991 only served to underline

this need. One Environmental Health Officer position simply is not adequate to cover all the needs of eight isolated communities.

RECOMMENDATION #7

A comprehensive plan in the event of an epidemic is required to provide clear guidelines which will allow for rapid response in outbreak situations.

ACTION: The Environmental Health Division and Infectious Disease Control, Department of Health, will develop a draft response plan and circulate it for input.

EXPLANATION: One of the major points raised during the technical review is that there is no Territorial policy or procedures for dealing with disease outbreaks. The Environmental Health and Infectious Disease Control Divisions with the Department of Health indicated that they would be developing a generic outbreak investigation protocol along with disease-specific control protocols.

RECOMMENDATION #8

As the summer season approaches, it is necessary to carefully monitor instances of diarrhoeal disease in the Region and to begin a health promotion campaign.

ACTION: The Regional Nursing Officer will notify all communities in the Keewatin requesting that they monitor presentations of diarrhoea. Infectious Disease Control will continue to monitor diarrhoeal incidence. Health Centres and CHRs will continue with the public health education campaign which focuses on prevention of the spread of enteric organisms.

EXPLANATION: This recommendation is self explanatory. Monitoring must be ongoing

throughout 1992 to guard against a reoccurrence of 1991's outbreak.

RECOMMENDATION #9

Since the issues of water delivery and sewage disposal were seen as problems from the community level, the Keewatin Regional Health Board will address these matters in their report and ensure that the concerns are brought to the attention of Municipal & Community Affairs.

ACTION: The Environmental Health Division, KRHB, will address water delivery and sewage disposal concerns in the KRHB report.

EXPLANATION: Some concerns were expressed about the sewage disposal system currently operating in Arviat as well as the water delivery system. People were particularly concerned with the necessity of driving through sewage lagoon run off in order to get to Wolf Creek. They were also concerned with the drinking water coming from a shallow lake which is currently used to fill the reservoirs by pumping in the summer. These matters will be brought to the attention of Municipal & Community Affairs by the Sr. Environmental Health Officer.

RECOMMENDATION #10

Given preliminary data pointing to overcrowded housing and socioeconomic conditions as being mitigating factors in the spread of this disease, it is recommended that these factors be identified and brought to the attention of the Minister of Health for dissemination to other relevant parties.

ACTION: The KRHB will make the Minister of Health aware of the above noted concerns by inclusion of these concerns in their report.

EXPLANATION: The initial data available through the Canadian Paediatric Kidney Disease Reference Centre suggests a correlation between socioeconomic status and the risk for developing the severe complication of haemolytic uraemic syndrome. This type of correlation has always been suspected by health professionals but has been very difficult to prove in the past. Given this new information, it is imperative that the overcrowded housing conditions, the lack of pressure water systems in some households and the socioeconomic conditions which tend to exacerbate the aforementioned conditions, be addressed by the Government of the Northwest Territories in an overall plan to improve the health status of NWT residents.

RECOMMENDATION #11

Considering the concerns expressed over the carrier status of E. coli O157:H7 in caribou, it was felt that further investigation of this matter is required.

ACTION: A letter will be forwarded to the Hamlet Council in Arviat from the KRHB to gain their input on this matter. LCDC will ascertain the availability of additional funds for analysis of additional samples by their organization. Further discussion at a Regional level will occur concerning the value of a caribou sampling program versus a continued health promotion campaign.

EXPLANATION: Given the fact that two caribou samples were found to be positive, one for verotoxin and one for verotoxin & viable E. coli O157:H7 organisms, there was some concern expressed in the community about the safety of the herd. Lengthy discussions occured at the community and technical sessions as to why it was unlikely that the caribou was contaminated.

It was explained at the Community review that it is very difficult to check the caribou herd in a meaningful way. The example used was a study done where 2000 cattle were checked and no verotoxigenic E. coli were found, even though we know that hamburger is contaminated. No decision was reached as to whether or not more sampling would be conducted. This issue will require further discussion at the Regional level.

RECOMMENDATION #12

A manual which provides current information on reportable communicable diseases, including reference materials and reporting guidelines, is required.

ACTION: Infectious Disease Control in Yellowknife will prepare a Draft Manual and circulate it for comments.

EXPLANATION: A quick and readily available reference is needed by Community Health Nurses and Environmental Health Officers for all reportable communicable diseases. This will save valuable time when investigating an outbreak and will assure uniformity across the NWT. Infectious Disease Control is the best qualified Division to produce and disseminate this manual.

RECOMMENDATION #13

The "A" list of reportable diseases in the GNWT Communicable Disease Regulations should be reviewed and the Laboratories made aware of which diseases require immediate reporting by telephone.

ACTION: The Acting Chief Medical Health Officer will review the "A" list and forward a letter to the Manitoba Health Services Commission advising which notifiable diseases require

immediate reporting by telephone.

EXPLANATION: To avoid confusion on the reporting of communicable diseases, the Laboratories must have a clear indication of which diseases have a higher priority and must, therefore, be reported immediately via telephone.

RECOMMENDATION #14

Given the fact that Health Centre staff and the community in general are under a tremendous amount of stress in an outbreak situation, the availability of counselling services must be examined.

ACTION: The Acting Chief Medical Health Officer will forward information to the GNWT Department of Health and the KRHB on a Health & Welfare Canada employee who deals with stress management.

EXPLANATION: An incredible amount of stress was felt both in the community and by Health Professionals involved in the disease containment efforts. Programs which help individuals to deal with inordinate amounts of stress and critical incidence need to be identified for use during future crisis situations.

RECOMMENDATION #15

Resources are required to assist in coping with heavy media attention during a crisis situation.

ACTION: LCDC will provide the Region with a media kit which they have available and the Acting Chief Medical Health Officer will provide information on the services available in

Yellowknife.

EXPLANATION: Dealing with media attention during the outbreak required a considerable amount of time. In many instances it detracted from the ability of personnel to carry out necessary disease interventions. This was felt to be mainly due to a lack of understanding of dealing with the media and a lack of understanding of exactly what the media required. Further training in this area along with "media kits" is required by staff involved in media relations.

RECOMMENDATION #16

A need for some form of direct reporting of notifiable diseases between Cadham Laboratory and the Department of Health in Yellowknife was identified.

ACTION: The Acting Chief Medical Health Officer will hold discussions with Cadham Lab re: direct reporting of results to the GNWT Department of Health.

EXPLANATION: To avoid the confusion and delay which is quite often evident when notifiable diseases are first reported to the Health Centres, to the Regional Health Board and then to the Department of Health, it was agreed that a mechanism should be put in place which would see simultaneous reporting to the Regional Health Board and the Department of Health from laboratories.

RECOMMENDATION #17

A work load study to assess work loads and human resources at Health Centres is required given the fact that Health Centre staff were stretched to their limit during the epidemic.

ACTION: Nursing Services, Department of Health, currently has a workload study under way

which they will make available upon it's completion.

EXPLANATION: The KRHB feels that staffing levels in many Health Centres are inadequate at this time. Disease outbreaks further exacerbate the strained situation. The workload study currently being undertaken by Nursing Services will hopefully identify some of the shortfalls in levels of staffing.

RECOMMENDATION #18

The agreement between the Laboratory Centre for Disease Control and the GNWT Department of Health should be expedited to avoid delays in arranging for LCDC response during epidemic situations.

ACTION: The KRHB will recommend expediting the agreement in their report.

EXPLANATION: There is currently no formal agreement between the Laboratory Centre for Disease Control and the GNWT Department of Health to respond to outbreak occurrences. An agreement would settle jurisdictional questions and allow for rapid response to a request for assistance at the onset of an epidemic.

RECOMMENDATION #19

A list of the services available from the Laboratory Centre for Disease Control in dealing with epidemic situations is required by all concerned parties.

ACTION: LCDC will provide a list of their services available to the Keewatin Regional Health Board, the GNWT Department of Health and the J.A. Hildes Northern Medical Unit.

EXPLANATION: This list of services is necessary so that Health Board personnel and GNWT

Department of Health personnel are aware of the resources which are and are not available from LCDC.

RECOMMENDATION #20

A cost analysis needs to be prepared to compare the cost of treatment with the costs of an effective prevention campaign. Other relevant cost analysis would include the cost of treatment versus the cost of improving socioeconomic conditions.

ACTION: The KRHB and Department of Health will undertake a joint cost analysis of the outbreak.

EXPLANATION: In order to identify the costs associated with a major disease outbreak it is necessary to conduct a detailed cost analysis. This information would be very useful in comparing the extreme costs of an epidemic compared with the costs of preventative measures and improving socioeconomic conditions.

CHAPTER 3

KEEWATIN REGIONAL HEALTH BOARD

REPORT/ACTION PLAN

Prepared by: ***Robert Kielly*, CPHI(C)**

Sr. Environmental Health Officer

Keewatin Regional Health Board

This report will deal with some of the specific actions and concerns of the Keewatin Regional Health Board in relation to the 1991 E. coli O157:H7 gastroenteritis outbreak. Many of the actions of the Health Board staff have been covered in other chapters. For the sake of brevity, these will not be repeated.

It is the mandate of the Keewatin Regional Health Board to deliver medical services involving treatment, prevention and education to the people of the Keewatin Region. An important part of this mandate is to involve communities in health care delivery. As a result, the first actions taken involved the development of a Coordinating Committee at the Regional level to deal with the outbreak. Those involved at this level included the Regional Nursing Officer (RNO), the Senior Environmental Health Officer (EHO), the Executive Director, the Senior Nursing Officers, the Director of Finance and Administration and Support Staff. The RNO and the EHO, in consultation with others, were mainly responsible for the regional response to the epidemic and coordinating the efforts of all involved groups. This team coordinated the efforts of a number of groups including the Keewatin Regional Health Board, GNWT Department of Health, Laboratory Centre for Disease Control in Ottawa, the J.A. Hildes Northern Medical Unit, Cadham Provincial Laboratories, Canadian Paediatric Kidney Disease Reference Centre, and the Churchill Health Centre. Some of the specific actions taken during the course of the epidemic on a Regional basis were as follows:

- Increased Nursing staff to cope with heavier workloads and to deal with public health needs.
- Increased Environmental Health staff to carry the message of prevention to other

Keewatin communities, ensure a high standard of waste disposal and water delivery services throughout the Region and continue the investigation of the Arviat outbreak.

- Arranged for increase in medivac services.
- Increased Churchill Health Centre medical staff to deal with patient loads.
- Bringing in Health Promotion people to assist in delivering the prevention message to other Keewatin communities.
- Arranged via teleconference with a nephrologist for education sessions for nurses in dealing with the potential effects of E. coli O157:H7.

The development of a Coordinating Committee to oversee events on a Regional basis was critical in assuring that the myriad of individuals and agencies involved were coordinating their activities to avoid duplication and to ensure that the most up to date information possible was reaching the various investigating bodies, especially the Community Health Nurses in the field, on a regular and timely basis.

Another extremely important role was issues management at a bureaucratic level. The Executive Director dealt specifically with this area in order to allow other staff to deal more directly with control of the epidemic. This included resolving issues of responsibility and funding with the Department of Health. The Executive Director also ensured that the Board of Trustees was kept aware of ongoing events through direct communication, arranging briefing meetings and issuing written updates.

Given the distances involved and the divergent groups involved, the main method of coordination was through the "Teleconference". Several of these were held each week to plan

actions on a Regional and Territorial basis and to disseminate information. These were ongoing from initial notification until the end of the epidemic. Clinical inservices via teleconferences were also arranged for the Nurses throughout the Region on the effects of E. coli O157:H7 gastroenteritis and on the causes, symptoms and effects of haemolytic uraemic syndrome.

The organizational aspects of outbreak control were among the most difficult to deal with from a KRHB perspective. The resources at the Health Board were stretched to their absolute maximum during the epidemic. Both the Regional Nursing Officer and the Senior Environmental Health Officer had other commitments on a day to day basis that simply had to be added to the incredible workload necessitated by the outbreak. In addition, the outbreak of red measles and the botulism incident, both of which occurred at the same time as the E. coli O157:H7 outbreak, further added to this workload. It is recognized that there will always be a certain amount of stress and extra effort required in any outbreak situation, however, it is the KRHB's feeling that several of the recommendations made as a result of the review process would help to alleviate these problems in future outbreak occurrences. In particular, the implementation of recommendations 1, 2, 3, 4, 5, 6, 7, 12, and 14 would be particularly beneficial from a KRHB perspective on this area.

Another area that required a great deal of time and effort was the staffing of Nursing positions throughout the outbreak. Public Health Nurses were assigned in each of the severely affected communities, which often resulted in the need to backfill positions in other Health Centres. Extra nursing staff had to be found to ensure that Nursing Services were maintained

at their maximum in the three most severely affected communities while at the same time not reducing the minimum level of services in other Keewatin Region communities. Given problems with vacation leave, sick leave and normal staff turnover, this area took a considerable amount of time. The implementation of recommendations 3, 5, 14, and 17, from the review process, would help to alleviate these problems in future outbreak situations.

The Environmental Health Officer, in addition to his "normal" duties of water systems checks, food sampling, food service inspections, etc., which he would regularly undertake in an outbreak situation, also had a large role in the coordination efforts. Samples collected within the community of Arviat in an attempt to ascertain the source of the outbreak included water samples, caribou, seal, goose, goose droppings, char and various store bought meats. Some sampling, especially of hamburger, was also conducted in other communities.

In addition to food and water sampling, all retail outlets were inspected by the EHOs. Full participation in the public awareness campaigns and in the development of educational material was continuing at this time along with the liaison and consultation role with local Hamlet Councils and Health Committees.

In the community of Arviat a poster campaign was conducted by the Community Health Representative (CHR) with the assistance of nursing staff. In addition to the poster campaign, the CHR went on the local radio advising people of the presence of this organism in the community and the measures we were trying to institute to control the spread. As we were unaware, at that time, if there was a continuing source of infection in the community, the message was very broad and was meant to cover as many as possible potential sources of spread.

We received feedback from the community that this message was effective.

In addition to the poster campaign and radio announcements, contact was made with the Health Committee and the Hamlet Council within one week of notification of the first positive cases. Continued contact with the Health Committee and the Hamlet Council was maintained throughout the outbreak. Phone in radio shows were also organized to assist the community in understanding the issues. These phone in shows were organized by the CHR with assistance and involvement by the Health Committee, Department of Health Staff, Health Centre staff and KRHB staff. Partnership with all those affected was required to stop the spread of this disease.

Given the size of the epidemic, the number of people involved and the fact that the epidemic began to spread throughout the Region, extra resources had to be called upon. This need was initially satisfied by the Head and Assistant Head of Environmental Health with the Department of Health. As the outbreak continued and the necessity for broad education campaigns and facilities checks in all of the Keewatin Region communities became apparent, the hire of four additional EHOs for varying lengths of time was necessary. These extra people conducted necessary inspections in every Keewatin Region community, participated in community education and awareness campaigns across the Region and assisted with the continuing disease investigation program. Part of their role was to "catch up" on some of the routine Environmental Health work that had fallen behind as a result of the disease outbreaks.

The implementation of recommendations 3, 6, and 14 from the review process would help to alleviate some of the problems experienced by Environmental Health during the course of this outbreak. It is recognized that this was an extraordinary situation, however an adequate

level of Environmental Health staff in the Region would somewhat alleviate the problems experienced.

Media attention during the outbreak was very heavy. The Environmental Health Officer was appointed the media spokesperson and this further compounded the difficulties already being experienced in the carrying out of day to day duties. At certain times there were as many as ten to twelve media calls per day. The Keewatin Regional Health Board recognized the importance of keeping everyone informed and, therefore, made every effort to answer all media calls. This was, however, an area where extra support and resources were needed. The implementation of recommendations 1, 2 and 15 from the review process would certainly help in dealing with this aspect of outbreak control in the future.

At a Keewatin Regional Council meeting in the autumn of 1991, Arviat Mayor, Paul Pemik, personally thanked the KRHB for its' hard work and effort. The Keewatin Inuit Association also gave a vote of confidence for the KRHB's work during the epidemic. People from Arviat who had children affected have come to the Regional office to extend personal thanks. It has been truly gratifying to see this level of support in the community. The KRHB is proud of the people in Arviat, the professionals, organizations and individuals who worked so diligently to contain the spread of this epidemic.

In order to encourage an open and honest discussion of the events which transpired during the epidemic, the KRHB organized a review for early May, 1992. This process took place in two portions: a community review in Arviat and a technical review immediately after in Rankin Inlet. As a result of the review process, the Keewatin Regional Health board has been

tasked with a number of recommendations. To properly address these recommendations, the KRHB will go on record with the following actions:

ACTION #1

Resulting from Recommendation #1 from the Community/Technical Review, the Keewatin Regional Health Board will endeavour to appoint a local coordinator for major communicable disease outbreak situations in Keewatin region communities. The KRHB will also develop a plan to keep Hamlet Councils and other interested parties fully informed and involved in disease containment efforts.

ACTION #2

Resulting from Recommendation #5 from the Community/Technical Review, the Keewatin Regional Health Board asks the Minister of Health to approve the budget necessary to hire a dedicated Public Health Nurse in the communities of Arviat, Baker Lake and Rankin Inlet. These individuals would be additional to existing staff and not a reallocation of already over stretched resources.

ACTION #3

Resulting from Recommendation #6 from the Community/Technical Review, the Keewatin Regional Health Board asks the Minister of Health to approve the budget necessary to hire a second Environmental Health Officer to be permanently allocated to the Keewatin Region.

ACTION #4

Resulting from Recommendation #8 from the Community/Technical Review, the Keewatin Regional Health Board will assure that monitoring of diarrhoeal presentations throughout the summer is ongoing by advising the Nurse in Charge in each Keewatin Region community of this requirement and requesting weekly diarrhoeal disease incidence updates. Measures will be taken to ensure that Health Centres in the Region have begun an enteric disease prevention campaign, focusing on the public health messages used during the 1991 epidemic.

ACTION #5

Resulting from recommendation #9 from the Community/Technical Review, the Keewatin Regional Health Board will advise the Department of Municipal and Community Affairs of Arviat residents' concerns with the sewage disposal system and the water supply system. One of the main concerns expressed was the fact that the water is pumped into the reservoir from a shallow lake and therefore often has a bad taste and a lot of sediment. The other major concern is that the run-off from the sewage lagoon is in a location that makes it necessary for people to drive directly through it to get to Wolf Creek where many community residents get their drinking water.

ACTION #6

Resulting from Recommendation #10 from the Community/Technical Review, the Keewatin Regional Health Board advises the Minister of Health of preliminary data that shows socioeconomic conditions, including inadequate housing, to be mitigating factors in disease

spread. Further action on this area is left to the discretion of the Minister of Health.

ACTION #7

Resulting from Recommendation #11 from the Community/Technical Review, the Keewatin Regional Health Board will undertake further consultation with the Hamlet Council of Arviat concerning the need for additional caribou sample collection. This matter will also be discussed with Renewable Resource staff and at the Health Board level. Given the relative lack of any firm data pointing to caribou as a source of E. coli O157:H7, it is the KRHB's opinion that further sampling is unnecessary.

ACTION #8

Resulting from Recommendation #18 from the Community/Technical Review, the Keewatin Regional Health Board recommends to the GNWT Department of Health that the agreement between the Laboratory Centre for Disease Control and the GNWT Department of Health be concluded as soon as possible in order to avoid confusion with LCDC's role in future outbreak situations.

ACTION #9

Resulting from Recommendation #20, the Keewatin Regional Health Board will ask the Department of Health's Finance Division to work with the KRHB's Finance Division so that a complete cost analysis of the outbreak can be conducted.

SECTION III

REPORTS

CHAPTER 4

SEQUENCE OF EVENTS

Prepared by: ***Robert Kielly*, CPHI(C)**

Sr. Environmental Health Officer

Keewatin Regional Health Board

The Health Centre in Arviat first received a telephoned report of a "verotoxin positive" stool on June 19, 1991 but the causative organism was not identified. The first report of a positive stool culture for E. coli O157:H7 was received June 28, 1991. Upon receiving the result, the Acting Nurse in Charge, Wendy Murphy, notified her supervisors at the Keewatin Regional Health Board and the Chief Medical Officer of Health in Yellowknife.

Keewatin Regional Health Board staff immediately met to discuss the incident and decide on an appropriate course of action. The Chief Medical Health Officer for the Government of the NWT was immediately contacted by Health Board staff and asked for direction on this matter. It was decided that initial actions would include monitoring of all diarrhoeal presentations and investigation of the situation. Meetings among Health Board staff to discuss disease prevention strategies and to plan appropriate courses of action were ongoing from this time until the end of the outbreak. An incredible amount of time was devoted to these activities including evenings and weekends.

The Senior Environmental Health Officer (EHO), Robert Kielly, with the Keewatin Regional Health Board (KRHB) flew into Arviat on July 2, 1991 to conduct an investigation. It was assumed at this time that either food or water was the source of this illness, as is the usual case with E. coli O157:H7. Initial actions by the EHO included data compilation on individuals with diarrhoea, inspection of the water delivery systems and food outlets, sample collection of food and water and consultation with the Health Centre staff on control and prevention strategies. After his preliminary activities, the EHO returned to Rankin Inlet on July 5 to brief Health Board staff and organize further activities.

During the first week the Community Health Representative (CHR), Obed Anoee, was very active in attempting to get initial information to the public on the prevention of this disease. Posters were placed in public places throughout the community and radio announcements were made. The focus was initially very broad as there was no indication whether or not there was a continuing source of infection in the community. As a result, people were asked to cook all meat, boil drinking water and maintain a high level of personal hygiene. The personal hygiene message was focused on hand washing after using the washroom, after changing a baby's diaper and before eating or preparing food.

Throughout the first week of investigation, contact was maintained with the Department of Health in Yellowknife to gain advice and support wherever possible. Contacts were also established with the Laboratory Centre for Disease Control (LCDC) in Ottawa, the Centers for Disease Control in Atlanta, Georgia and with the J.A. Hildes Northern Medical Unit in Winnipeg. The Cadham Provincial Laboratory in Winnipeg was also contacted to ensure that positive E. coli O157:H7 results from stool samples were forwarded to us as soon as they were identified. The KRHB made extensive efforts to contact anyone who could provide us with up to date information on this disease as it was heretofore unheard of in the Keewatin. Teleconferences were ongoing between the KRHB and the Department of Health during this first week in order to organize an effective approach to the investigation and containment of the disease.

Individuals with diarrhoea continued to present and a few more positive cases of E. coli O157:H7 were identified in Arviat over the next week. As a result, activities intensified

in an effort to ascertain the source and contain the spread of the disease. A letter was forwarded to the Department of Health in Yellowknife requesting that the Chief Medical Health Officer take charge of the investigation as per the Public Health Act. The EHO returned to Arviat and the Head of Environmental Health, Jack MacKinnon, and the Territorial Epidemiologist, Dr. Carolyn Pim, from the Department of Health (Yellowknife) and two LCDC Epidemiologists, Dr. Ben Tan and Dr. Donna Holton, arrived in Arviat.

Over the next two weeks, a broad environmental sampling program was initiated which included water systems checks and food analysis of both store bought food and "country food" (i.e. seal, caribou, goose, char). A large amount of time was devoted to finding the source of the outbreak at this time. As with other E. coli O157:H7 outbreaks, it was felt that a continuing source might be present. Environmental Health was also involved in consultations with the Hamlet Council and the Health Committee in Arviat to advise them of the situation and to solicit any support that might be available. The collection of data utilizing food history questionnaires was ongoing. This information was necessary for the Epidemiologists to effectively conduct their studies.

The Nursing staff at the Health Centre in Arviat were extremely busy dealing with the large number of patients presenting for assessment and treatment of diarrhoea. They also organized the collection of stool samples and collected information required by the Epidemiologists. The Community Health Representative was indispensable throughout the outbreak. Tasks performed by him included assistance with the gathering of samples, assistance in the food history data compilation, general resource person on the community and ongoing

public education. Radio announcements by the CHR were made on a regular basis and the poster campaign was escalated in the community.

On July 17, 1991 the first positive results from food samples were received: one positive for verotoxin and the other positive for both verotoxin and viable E. coli O157:H7 organisms. The food positive in both cases was raw caribou. These samples had come from two households where there was a high incidence of diarrhoeal symptoms and where there were positive cases of E. coli O157:H7 gastroenteritis. Neither household refrigerated their meat. Caribou samples collected from other households with positive E. coli O157:H7 cases and with diarrhoeal symptoms present did not result in additional findings of contaminated caribou. Investigations concluded it was extremely unlikely that the caribou was the primary source of the outbreak in this community. Rather, it appeared that the caribou was simply a vehicle to pass the organism from an infected person to a new host. Further caribou samples over the summer revealed no more positive results for E. coli O157:H7 or for the verotoxin.

During the second week of July the first indications of increased diarrhoeal presentations appeared in the communities of Rankin Inlet and Baker Lake. This spread lent credence to the theory of person to person spread since there was some history of travel by infected individuals to the newly affected communities. The first of two children to die with complications from HUS died at this time.

The KRHB decided to switch their efforts to focus primarily on the prevention of further person to person spread rather then focusing on the search for a continuing disease source in the community, for example, contaminated water or food. Since the evidence was increasingly

pointing to person to person spread and the organism had been in the community for some time, the KRHB felt that this would be a much more effective use of resources. Besides, there was no apparent evidence of a continuing source within the community. This approach met with some resistance from the various experts involved because the available literature did not identify person to person spread as a major concern in the community setting and it could not be unequivocally stated that there wasn't a continuing source of infection. To allay these concerns, some food and water sampling continued.

As a result of this spread within the Region, it was decided that a number of new initiatives would be undertaken. First of all, an additional CHR, Sylvia Mala, was hired in the community of Arviat to assist in the disease prevention program and to help develop locally acceptable health promotions materials. A radio call-in/information show was organized, community awareness programs were ongoing and further meetings were held with the Hamlet Council and the Health Committee. It was agreed to implement a door to door educational campaign to try and stop the spread of the disease. Many of these measures, particularly the community awareness programs and the phone in radio shows were later used in other affected communities.

As the disease continued to spread, it was decided that an additional nurse would be assigned to each of the three affected communities. They followed up on positive E. coli O157:H7 cases, worked with the affected families to help contain the spread and assisted in public education. The Environmental Health Division in Yellowknife continued to provide direct on site help and consultation via telephone. The Health Promotion Division developed

educational materials and arranged for their translation into Inuktitut.

Frequent teleconferences were scheduled in order to review the situation, gain input and advice and decide on strategies available. Participants included the J.A. Hildes Northern Medical Unit, the Laboratory Centre for Disease Control, the GNWT Department of Health and the Keewatin Regional Health Board.

In early August a decision was made to contract the services of an Infectious Disease Consultant, Dr. Pam Orr, to advise the KRHB and to work directly with the communities of Arviat and Rankin Inlet. With the increased incidence of diarrhoeal disease in Baker Lake, LCDC provided epidemiological staff to work in this community from August 13 until September 16. LCDC also returned to Arviat to conduct further epidemiological work.

Additional Environmental Health staff were hired to conduct routine Environmental Health investigations throughout the Region in an attempt to prevent the spread to unaffected communities, to assist in public education and to assist in disease investigation should it occur in the "unaffected" communities. The Health Promotion Division provided several staff members to conduct public awareness and education programs in Keewatin communities in conjunction with the EHOs, local Health Centre nurses, Health Committees and Health Board Trustees. The Canadian Paediatric Kidney Disease Reference Centre also visited Arviat during early and mid August to enrol children from this community in their haemolytic uraemic syndrome study.

In order to ensure that the data on diarrhoeal presentations and the laboratory results from Cadham Provincial Laboratories were properly documented, Dr. Lisa Lugtig with the

Rankin Inlet Health Centre took over the entering of all the pertinent information in to the Epi Info computer program. This data was made available to the various experts who required it for their analysis, to the GNWT Department of Health and to the KRHB.

By the last two weeks in August actions taken included voluntary isolation of affected families, continued public awareness programs and major community participation to help contain the spread of the disease. Hamlet Councils took actions such as cancelling meetings and recreational events, participating in phone in radio programs and in Arviat's case, the actual provision of staff to participate in door to door education campaigns. Travel was voluntarily curtailed throughout the Region, especially between the communities of Arviat, Baker Lake and Rankin Inlet. The Hamlet Council of Arviat took measures to close the school and limit accessibility to public locations for high risk individuals, i.e. children.

A steady decline in the number of positive cases was seen throughout the month of September and the last official case was recorded on October 9, 1991. One additional case in December was considered a sporadic case by the Epidemiologists.

It was agreed early in the disease outbreak that a community and technical review of the entire outbreak would take place when it was over. The review was originally planned for the month of January, 1992 and was to be held in Arviat. Unfortunately, a GNWT restraint program limited the availability of key people so the decision was made to postpone the review until a later date. The review was finally organized for May 5 to May 8, 1992. The community review took place on May 5 and May 6 in Arviat and a technical review followed on May 7 and May 8 in Rankin Inlet. The review process was comprehensive with useful recommendations

emanating from both the community and technical portions.

The entire disease control effort in the Keewatin during the summer and fall of 1991 was a massive cooperative exercise. It is even more amazing considering that there was also a red measles outbreak and a severe botulism incident during the course of the E. coli O157:H7 epidemic. While there were areas for improvement identified with the handling of some aspects of the epidemic, it should be noted that all involved gave their very best in attempting to control the spread of the disease. Without the input and tireless cooperative efforts of local Hamlet Councils, Health Committees, Community Health Nurses, Community Health Representatives and staff from the Keewatin Regional Health Board, the Department of Health, the Laboratory Centre for Disease Control, the J.A. Hildes Northern Medical Unit, the Cadham Provincial Laboratory, the Canadian Paediatric Kidney Disease Reference Centre and countless other groups and individuals, the disease control effort would have been much more difficult if not impossible. It is hoped that the lessons learned during this troublesome time will result in positive input to the development of measures to deal with future communicable disease outbreaks in the Northwest Territories and elsewhere.

CHAPTER 5

REPORT BY

P.H. ORR, M.D. FRCPC

A Report to the Keewatin Regional Health Board on the Outbreak of E. coli O157:H7 Gastroenteritis in the Keewatin District, NWT June - October, 1991

P.H. Orr, M.D. FRCPC

Assistant Professor,

Department of Community Health Sciences

(J.A. Hildes Northern Medical Unit),

Medicine and Medical Microbiology,

University of Manitoba

March, 1992

TABLE OF CONTENTS

INTRODUCTION AND ACKNOWLEDGEMENTS

Between June and October 1991 (inclusive) an outbreak of E. coli O157:H7 occurred in the Keewatin District of the Northwest Territories. Cases were diagnosed in Arviat, Chesterfield Inlet, Baker Lake, Rankin Inlet, Whale Cove and Sanikiluaq. The J.A. Hildes Northern Medical Unit of the University of Manitoba was asked by the Keewatin Regional Health Board (KRHB) to provide consultative advice regarding the investigation and control of the epidemic. On-site services were provided by Dr. P.H. Orr in Arviat and Rankin Inlet from August 20 through September 3, 1991, with subsequent epidemiologic, laboratory and clinical liaison provided from Winnipeg via telephone and FAX from September through October 1991. A summary of Dr. Orr's activities is provided in Appendix 1. The investigation and control of the epidemic was achieved through the efforts of community health workers, health committee and community members, municipal council members, nurses, environmental and promotional health specialists, physicians and epidemiologists from the Keewatin, Yellowknife, Churchill, Winnipeg and Ottawa. Activities were coordinated by R. Brown and R. Kielly of the KRHB. The expertise and hard work of all these individuals is reflected in this report. The report has been written for the KRHB with the aim of providing a broad description of the origin and course of the epidemic, along with the results of the investigation and control measures that were implemented. A technical scientific paper is also being prepared in conjunction with the KRHB and other co-investigators.

This report is not intended for publication without permission of the author.

SCIENTIFIC BACKGROUND

In 1982, American scientists described the association between two outbreaks of bloody diarrhoea and infection due to the bacteria E. coli O157:H7, previously considered a rare illness. Since then numerous outbreaks in North America and Europe have been reported, occurring most commonly in the summer and in the fall.

This bacteria has been found in cattle, buffalo, pork, poultry and lamb. Meat is contaminated during the slaughtering and packaging process. Transmission to humans occurs through eating undercooked contaminated food, particularly hamburger and unpasteurized milk, and through person-to-person spread. Illness is due to the production of toxins (VT) by the bacteria, which damage the gut, blood vessels and in some cases other organs (eg. kidney) of infected individuals. There is no specific cure for this infection. Antibiotics have not been proven to help. Medical care involves giving patients fluids and treating any complications, such as kidney failure, that develop.

Those who are infected with this bacteria may remain healthy, or may become ill with diarrhoea, anaemia or a disease called haemolytic-uraemic syndrome (HUS) which leads to kidney failure, high blood pressure and sometimes death. It is known that those who are exposed to a large number of the bacteria and those with no immunity to the bacteria are more likely to become ill than others. However the exact way in which this bacteria causes disease in the body is unclear. It is also unclear how often this bacteria causes illness in North America and other areas of the world. The outbreak which occurred in the Keewatin District of the

Northwest Territories in the summer of 1991 was the largest epidemic of diarrhoea due to E. coli O157:H7 ever reported.

METHODS

The epidemic occurred from June to October 1991 in the communities of Arviat, Baker Lake, Rankin Inlet, Whale Cove, Chesterfield Inlet and Sanikiluaq. Primary care was provided by nurse-practitioners and visiting physicians at the health centre in each settlement. Patients requiring hospital care were sent to Churchill and Winnipeg, Manitoba. Consultative advice for the investigation and control of the outbreak and for patient care was provided by physicians from Winnipeg, Ottawa and Yellowknife. Definitions for illness (a "case" and "HUS") were developed (Appendix 2), and information on all sick individuals was obtained by nurses and doctors from patient interviews and physical examinations. Charts were also reviewed from previous years to obtain information on how frequently diarrhoea occurred in the past.

Stool specimens were collected from sick individuals and sent to Cadham Provincial Laboratory, (CPL) in Winnipeg, Manitoba. The stools were analyzed for the presence of E. coli O157:H7 bacteria and toxin (VT). Further testing of positive stools was performed at the Laboratory Centre for Disease Control (Mr. H. Lior, Ottawa). A confirmed case was defined as an individual with a stool from which E. coli O157:H7 was grown or VT was detected. A case was considered unconfirmed if the stool was culture and VT negative, or if a stool specimen was not collected.

Food samples were collected from the homes of affected individuals as well as stores in Arviat and Baker Lake where the majority of cases occurred. The samples collected from homes of ill individuals included frozen, raw (thawed) and cooked caribou, beluga muktuk, seal, goose

and arctic char. Samples from local stores included frozen ready-to-eat foods, raw chicken and beef (including ground beef). The food was sent to CPL in Winnipeg for analysis.

Random samples of dry goose faeces were also collected from the tundra and analyzed by CPL. Caribou faeces and intestinal contents were collected by environmental officers during a hunt of the local herds near Arviat and were sent to the Provincial Veterinary Services Laboratory in Winnipeg. Further caribou samples were collected by Keewatin Wildlife officers and were sent to other laboratories; these results were not available to the author at the time of writing this report and are not included here.

Water samples from the natural lake reservoirs outside the affected settlements and from post-treatment (chlorination) sources in homes, schools and other community facilities were collected.

RESULTS

Between June 1 and October 31, 1991, 521 individuals from the six settlements of Arviat, Baker Lake, Rankin Inlet, Whale Cove, Chesterfield Inlet and Sanikiluaq developed diarrhoea. The epidemic curves for the six communities are shown in Figure 1. The first cases occurred in Arviat and it was the most severely affected settlement. The population characteristics of the cases are shown in Table 1. Of those affected 270 were female and 251 were male. The median age was 6 years with a range of 1 month to 90 years old. Forty-seven percent of cases were less than 5 years of age and 13% were less than one year old.

Of the 521 cases, 151 (28.9%) were confirmed positive (culture and/or VT positive) and 370 were unconfirmed (absent or negative stool specimen). The sex ratio was similar for confirmed and unconfirmed cases; however confirmed cases were significantly more likely to be younger in age than unconfirmed cases.

The attack rates of diarrhoea, for confirmed as well as all cases, are shown by age group and settlement in Table 2. Attack rates were highest in Arviat and in children age 1-4 years. There were no significant differences in attack rates for males compared to females.

Clinical Manifestations

Of the 521 cases, 103 (19.7%) gave a history of bloody diarrhoea, 328 (62.9%) had non bloody diarrhoea and 90 (17.2%) were unsure. Individuals with a history of bloody diarrhoea were significantly more likely than those without bloody diarrhoea to have stools confirmed positive for E. coli O157:H7 or toxin. Clinical data were available for the first 63 cases of

diarrhoea initially presenting in Arviat. Thirty-four (53.9%) of the 63 gave a history of abdominal pain, 11 (17.5%) complained of nausea, 32 (50.8%) experienced vomiting, and 13 (20.6%) experienced fever. There was no significant difference in clinical symptoms between confirmed and unconfirmed cases.

Patients were treated supportively with fluid and electrolyte management and were closely monitored for the development of complications of infection including HUS. Antibiotics were not prescribed. Sixty-seven patients were transported to Churchill and Winnipeg for hospitalization. HUS developed in 22 cases, representing 4.2% of all 521 diarrhoea cases or 14.5% of the 151 confirmed cases. The clinical features of the HUS cases are shown in Table 3. The male to female ratio was 1.7:1. Seventeen (77.2%) of the 22 patients were less than five years of age; one patient was 67 years old. Stools were positive in 21 of the 22 HUS cases.

Death occurred in 2 children, or 9.0% of the 22 HUS cases, 0.4% of all diarrhoea cases and 1.3% of confirmed diarrhoea cases. The immediate cause of death in the first case was cardiac tamponade (bleeding around the heart) and in the second was a brain haemorrhage. Autopsies in both cases revealed acute bloody inflammation of the intestines, as well as inflammation of the kidneys, heart and lungs. Acute inflammation of the pancreas was present in the first patient who died.

Laboratory Investigations

A total of 556 stool specimens were obtained from 341 (65.4%) of the 521 affected individuals (Table 4); we were unable to obtain specimens from the remaining 180 cases.

Of the 556 specimens, 204 (36.6%) were positive; these specimens were collected from 151 individuals who represent 28.9% of all cases and 44.2% of cases from whom stool specimens were obtained. Single stool specimens were obtained from 222 individuals, two specimens from 72 individuals, 3 specimens from 20 persons and 4 or more specimens from 27 persons. Twenty-two specimens consisted of stool swabs and 534 consisted of faecal samples sent in sterile containers.

The first 99 isolates of the E coli O157:H7 bacteria were sent to the Laboratory Centre for Disease Control (LCDC) in Ottawa where they were analyzed by Mr. H. Lior. All of the E. coli bacteria tested were of the same type ("phage" type #32 and positive for VT1 and VT2 genes) except for one isolate from a one year old child ("phage" type #34 and positive for VT1, VT2 and variant VT2), who became ill in Baker Lake in August 1991.

In order to determine how long people who are infected with E. coli O157:H7 continue to excrete the bacteria after they become infected, stool swabs for culture were obtained at approximately weekly intervals from July 15 to October 8, from 28 culture positive individuals in Arviat. Twenty-four of the 28 swabs were negative approximately 7-10 days after the first positive sample. Three of the 28 swabs (11%) were positive for the bacteria at 10-13 days, and one (4%) was positive at 39 days. All four persons who continued to excrete the bacteria in their stools felt well and had no diarrhoea. There was no significant difference in age or sex between "excreters" and "non-excreters".

Case-Control Studies

A chart review was performed by Dr. Donna Holton in Baker Lake to determine the frequency of diarrhoea in the community prior to 1991. In 1989 and 1990, 0.7 - 3.2% of children less than 4 years of age were seen in the local Nursing Station with diarrhoea in the months of April, May and June. The number of diarrhoea cases presenting in this age group in June 1991 was significantly higher than in the two previous years.

The first case of bloody diarrhoea occurred on June 4, 1991 in a 1-year-old female in Arviat, and the first confirmed case occurred in her uncle, a 34-year-old Arviat man who became ill on June 8th. The families of these two cases frequently visited each other's houses and shared meals together. The second confirmed case occurred in a 4-year-old boy in Chesterfield Inlet, who became ill on June 9th. He had not had contact with any individuals from Arviat during the several weeks before he became ill.

The original source of infection in these first cases is unknown. The subsequent epidemic curves are consistent with person-to-person transmission, although infected food may also have been a continued source of the bacteria.

A comparison of ill versus non-ill persons ("case-control" study) was performed by LCDC physicians in Arviat and Baker Lake. Matched for age and sex, ill persons were more likely than non-ill persons to have visited the local Health Centre in the past (before the outbreak) for diarrhoeal illness, and were more likely to have visited other households during the outbreak. There were no significant differences between cases and controls in diet (including

the consumption of cooked or raw, frozen or thawed ground beef, caribou or other meats), methods of food preparation, hand washing, diapering practices or visits to other affected communities. A review of hand washing revealed that 75% of individuals reported washing their hands after diapering a child, 72% reported hand washing after toilet use, but only 41% reported hand washing before eating.

Environmental Investigation

Various bacteria were detected in 14 of the 64 chlorinated and unchlorinated water samples submitted during the outbreak period. However, the E. coli O157 bacteria was not detected in any of the water samples.

VT was detected in 6 of 63 food items submitted. Four of these samples were frozen ground beef obtained from retail outlets in Arviat and Baker Lake. The remaining two VT positive samples were raw caribou meat obtained early in the outbreak investigation from two homes of infected persons. E. coli O157 was also grown from one of the caribou samples. The caribou meat had been handled in the home by several family members with diarrhoea. It is therefore unclear whether it was originally contaminated at the time of slaughter or subsequently from handling by infected individuals.

The samples of goose and caribou faeces and of caribou intestinal contents were negative for E. coli O157:H7 and VT.

Control Measures

In addition to the investigation outlined above, the following prevention and control

measures were implemented:

1. Development of widespread community education programs regarding the illness, how it is transmitted and how to prevent it. Use was made of the media (radio, TV, newspapers) and teaching took place in the home, schools and the local Health Centres. Those involved included lay health workers, nurses, health educators, physicians, environmental specialists, teachers and health and social service committee members. "Open houses" were held in the Arviat and Baker Lake Health Centres. Posters were made and soap was distributed to encourage hand washing.

2. Educational efforts during the epidemic focused on the need to thoroughly cook meat and to wash hands and utensils prior to and during food preparation. Although the importance of raw caribou in the local diet is well known, the frequency of consumption of raw store-bought hamburger was not appreciated until in-depth dietary interviews were conducted. Several hunters who were interviewed noted that caribou herds near Arviat were unusually thin during the summer of 1991 and they suggested that local residents may have eaten more store bought meat during that period. We are attempting to obtain information on total meat sales in the affected communities in order to see whether this occurred.

3. Multiple cases were seen within immediate and extended families. Factors that may have promoted person-to-person transmission include crowded housing and the intermingling of large numbers of people in homes and public meeting places. When the epidemic failed to abate with the measures outlined above, a system of "voluntary"

isolation was instituted in order to reduce person-to-person transmission. Patients with diarrhoea were urged to stay home for the duration of the illness and until free from diarrhoea for three days. A closer analysis of cases occurring in school-aged children failed to reveal any specific pattern of transmission within the classroom or school as a whole. However, when cases continued to occur in school-aged children as well as teachers, the Arviat school was closed for a short period of time.

4. Public meetings for consultation were held in Arviat, Baker Lake and Rankin Inlet. Assistance was given to the communities (mayor and council, education and health committees) in their decision-making regarding the opening and closing of the schools and limitations on public gatherings.

5. Public health inspections were made of food handling practices and of garbage and sewage disposal areas in various communities.

6. Guidelines were drawn up for the clinical care and follow-up of patients (Appendix 3). After informed consent was obtained, children with HUS were enroled in the Canadian Paediatric Kidney Disease Reference Centre Study of this disease. A protocol for the notification and listing of cases was developed, with periodic updates for involved health care personnel.

DISCUSSION

It is not known how often E. coli O157:H7 causes diarrhoea in Canada and the U.S.A. In Canadian laboratories E. coli O157:H7 has been found in 1.9-3% of all adult and paediatric stools sent for bacterial culture. American surveys have estimated that for a population of 100,000 people, E. coli O157:H7 infection occurs in 2-8 persons per year. Although E. coli O157:H7 is being recognized more often by doctors over the past decade, we do not know whether this is because the illness is becoming more common or because doctors are simply more aware of this illness.

The Keewatin outbreak represents the largest reported epidemic of E. coli O157:H7 infection. The last confirmed case of the epidemic was a four-year-old boy from Arviat who became ill on October 9, 1991. One further positive case occurred in Arviat in early December, but was considered a sporadic case. It is unclear whether the epidemic came to an end because of the control measures that were instituted or due to the development of some degree of immunity in the population or due to other as yet unknown factors. The following questions also remain unanswered:

1. What was the original source of the infection? Possibilities include ingested food (either store bought or wild meat) or contact between the first case and an infected person in the Keewatin or another area of the country. The first two confirmed cases became ill within one day of each other, yet they were from two different communities (Arviat and Chesterfield Inlet) and did not have contact with each other or any identifiable third

party. Subsequent to these cases, the pattern of illness was compatible with person-to-person spread, although continued reintroduction of infection into the community via contaminated food is also possible. It is clear that 25-36% of Canadian ground meat is infected and can cause disease if inadequately cooked. It is not known whether caribou are infected. Previous studies of E. coli infection of meat have not tested caribou. The few raw samples of caribou that tested positive may have become contaminated from people touching the meat.

2. Were Keewatin children more vulnerable to infection and illness than children in southern Canada? It is hoped that analysis of blood samples taken from affected children as part of the Canadian Paediatric Kidney Disease Reference Centre Study will help answer this question.

3. Did some people carry the E. coli O157:H7 bacteria without having diarrhoea or becoming ill? If so, did these people pass the infection to others? Asymptomatic "carriers" have been seen during other reported outbreaks, but we do not know if they existed during the Keewatin epidemic because stool samples were not sent from people who were well.

4. Were weather conditions (unusually hot summer) and possible changes in diet (fewer caribou, with greater reliance on store-bought meat) factors in causing the epidemic? Did the isolation of ill people have any effect on the epidemic? Why did the epidemic eventually end?

Suggestions for the future include the following:

1. Further studies be performed in order to answer questions #1 and #2. Strong consideration should be given to sampling of meat and intestinal contents of Keewatin caribou herds as part of a research study designed and implemented by local wildlife experts and hunters. Depending on the preliminary results of the Canadian Paediatric Kidney Disease Reference Centre Study, further programs should be implemented to answer questions on the role of host immune response and genetics in this disease.
2. Long term follow up of HUS survivors is necessary, as kidney failure requiring dialysis may eventually develop in 3.5% of affected children and high blood pressure in 5-14%.
3. Prevention of future outbreaks of E. coli O157:H7 gastroenteritis, as well as other diarrhoeal diseases, will depend on ongoing health promotion activities along with improvements in housing and sanitation. Education programs should emphasize hand washing and the proper storage and preparation of food, particularly store-bought meat.
4. Local communities must be involved with and have control over health education and promotion programs in order to ensure that they are effective and culturally appropriate.
5. Continued monitoring by public health workers for cases of diarrhoea and other infectious diseases in the Keewatin is necessary in order to recognize the early stages of epidemics and promptly initiate investigation and control measures.

FIGURE 1. EPIDEMIC CURVES

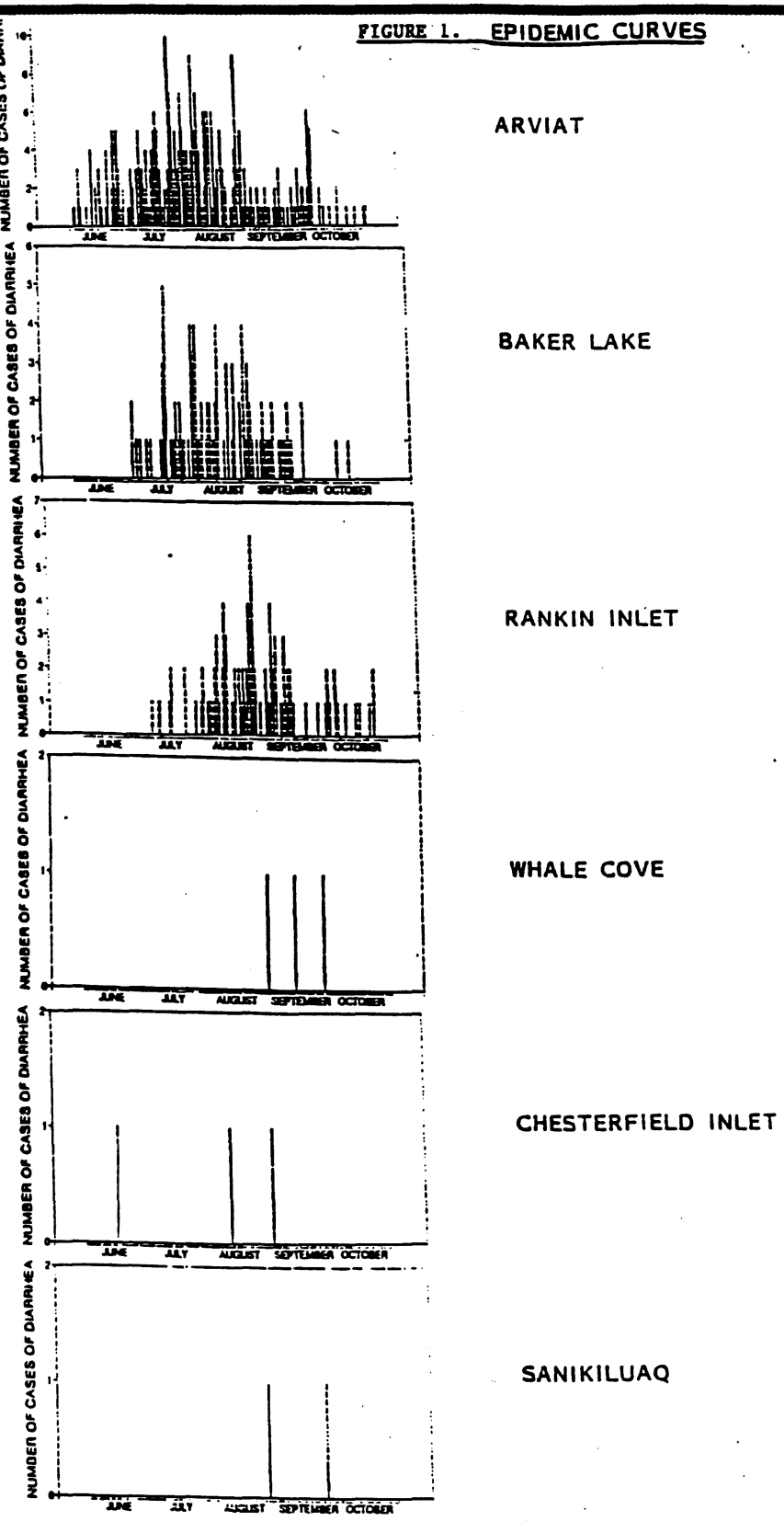


TABLE 1. Demographic Characteristics of Confirmed and Unconfirmed Diarrhea Cases*, NWT Outbreak 1991

Demographic Characteristic	Diarrhea Cases		
	All Cases (n=521)	Confirmed Cases (n=151)	Unconfirmed Cases (n=370)
Sex			
Females	270	76	194
Males	251	75	175
Age (yrs)			
<1	66	18	48
1-4	177	61	115
5-14	105	40	65 **
15-64	173	29	144
65+	7	3	4
Settlement			
Arviat	319	134	185
Baker Lake	98	10	88
Rankin Inlet	96	2	94
Whale Cove	3	2	1
Chesterfield Inlet	3	2	1
Sanikiluaq	2	1	1

* See text for definition

** $p < 0.001$

Table 2. Attack Rates of Diarrhea by Age Group and Settlement

Age Group (yrs)	Arviat		Baker Lake		Rankin Inlet		Whale Cove		Chesterfield Inlet		Sanikiluaq	
	All Cases	Confirmed Cases	All Cases	Confirmed Cases	All Cases	Confirmed Cases	All Cases	Confirmed Cases	All Cases	Confirmed Cases	All Cases	Confirmed Cases
0-1	43.2%	19.7%	19.4	1.3%	16.8%	0%	0%	0%	0%	0%	2.6%	2.6%
1-4	85.4	44.4	45.9	4.1	22.5	0.7	4.3	4.3	4.3	4.3	2.2	0
5-14	24.4	11.7	5.3	0.9	3.4	0	1.0	0	0	0	0	0
15-34	17.1	4.2	3.1	0	5.1	0	1.0	1.0	0	0	0	0
35-64	12.5	3.3	6.1	0.4	3.5	0.3	0	0	4.6	4.6	0	0
65+	29.4	17.6	4.8	0	0	0	0	0	0	0	0	0

TABLE 3. Clinical Features of HUS Cases, NWT Outbreak 1991

TOTAL NUMBER	22
SEX:	
Female	8
Male	14
AGE (yrs):	
< 1	2
1-4	15
5-14	4
15-59	-
60+	1
Mean	5.8
Range	10 mos. - 67 yrs
LABORATORY RESULTS:	
Confirmed	21
Not Confirmed	1
COMPLICATIONS:	
Peritoneal Dialysis	3
Witnessed Seizures	2
Hypertension	8
Death	2

* Data to be confirmed by Elaine Orrbine, Canadian Paediatric Kidney Foundation Study

TABLE 4. Results of Stool Analysis

	Total	Positive	Negative
No. (%) specimens	556	204 (36.7%)	352 (63.3%)
No. patients tested	343	151	192
Specimen characteristics			
No. (%) bloody	24	17 (70.8%)	7 (29.2%)*
No. (%) liquid	307	158 (51.5%)	149 (48.5%)*
Transit time (days)	4.3	4.2	4.3

*$p < 0.001$

APPENDIX 1: SCHEDULE OF CONSULTANT ACTIVITIES

P.H. Orr, M.D., FRCPC

Consultant, KRHB

Schedule of Activities:

Tuesday, August 20	- Arrival in Rankin
	- Meetings with KRHB and Health Centre staff
	- Conference calls with Baker and Yellowknife
Wednesday, August 21	- Planning discussions with R. Brown, Pauline Tan and R. Kielly
	- Conference call with Baker and YK
	- Meeting with Bette Palfrey, Chairperson KRHB
	- Arrival in Arviat
Thursday, August 22	- 9-12 a.m. Meeting with organizers of the Music Festival
	- 1-3 p.m. Meeting with Hamlet Council and Mayor (at their request)
	- Review of Nursing Station cases
	- 8-10 p.m. meeting with Community Education Committee (at their request)
Friday, August 23	- review of N/S data and consultation with nurses and CHR
	- 12-2:30 p.m. Keewatin wide radio program
	- food sampling at Co-op and Northern stores

	- 4 p.m. conference call with KRHB (Rose) Dr.'s Pim, Spika and Tan
	- in service with nurses
Saturday, August 24	- data collection and analysis
	- patient review
Sunday, August 25	- data collection and analysis
	- 11 a.m. conference call - Dr.'s Pim, Spika and Tan
	- patient review
Monday, August 26	- Conference with nurses and CHR
	- 10-12 a.m. meeting with Joint Social Services Council (their request)
	- data analysis
	- review of sick clinic patients
	- meeting with parent of recently deceased child
	- meeting with Health Committee
Tuesday, August 27	- Data analysis
	- Review of clinic patients
	- Telephone conference with Chief of Staff, Churchill
	- Development of Isolation Policy and Food/Environmental Sampling Policy
Wednesday, August 28	- Meetings with Church leaders (RC, Anglican, Glad Tidings)

	- Visit to water reservoir and garbage disposal site with Mayor
	- Radio program
	- Meeting with Jack Anawak, MP
Thursday, August 29	- Data analysis
	- Travel to Rankin
	- Radio program
	- Meeting with KRHB personnel
Friday, August 30 -	
Monday, September 2	- Design and testing of questionnaire forms
	- Development of protocols for patient care, data collection and analysis, patient follow-up, as well as letters to parents of HUS cases and clinical update letter to Keewatin nurses
Tuesday, September 3	- Travel to Winnipeg
Tuesday, September 3 -	
Thursday, September 26	- 16 hours of consultant time from Winnipeg
	- Review and analysis of statistics
	- Phone consultation with KRHB, nursing stations, LCDC, Arviat school (J. Williamson)
October 1991-March 1992	- Compilation and analysis of laboratory and clinical data
	- Telephone consultation with Ottawa (LCDC) and KRHB

- Literature review

- Preparation of KRHB and scientific reports

APPENDIX 2: DEFINITIONS

Case of Diarrhoea: An individual with two or more watery stools in a 24 hour period.

HUS (Haemolytic Uraemic Syndrome):

An individual with all three of the following criteria:

1. Haemolytic anaemia of recent onset (haemoglobin less than two standard deviations below the mean for age), with evidence of schistocytes in the peripheral blood
2. Thrombocytopenia (platelets < 150 x 109/L)
3. Azotemia (kidney impairment) with creatinine 97th percentile for age, or urea > 7 mmol/L

APPENDIX 3: NORTHERN MEDICAL UNIT PROTOCOLS

FOR THE PARENTS OF CHILDREN WITH HUS (HAEMOLYTIC URAEMIC SYNDROME)

The Haemolytic Uraemic Syndrome is an illness that affects the kidneys and sometimes other parts of the body including heart, brain and gut. In Keewatin children it has recently been caused by a small bacteria called E. coli O157. The illness often starts with diarrhoea. Most children get better after one week; some children get HUS one or two weeks after the diarrhoea. HUS is caused by a poison (called a "toxin") made by the E. coli bacteria.

If your child had HUS, he or she would have been seen in a hospital. When the child returns to your home from hospital, he or she needs regular check-ups at your local Nursing Station or Health Centre. They should be seen at 1 week and at 2 months after leaving hospital. They will be examined and the blood and urine will be checked. If these visits show that your child is doing well, he or she should then be seen yearly by the visiting doctor and by the nurses.

However, if your child is having any problems, please bring him or her to the Nursing Station right away. Problems that we look for include headache, feeding difficulties, fever, diarrhoea, vomiting, breathing difficulties and others. Also, if the nurses or doctors are concerned about problems in your child, they may ask you to bring him or her more frequently for check-ups.

These check-ups are important because some children who have had HUS get kidney problems later in life. However, we hope to do as much as we can to prevent these problems from happening, and to give your child the best care possible.

If you have any questions feel free to ask your local nurse(s) or the visiting doctor or Community Health Representative.

P.H. Orr, M.D.

E. COLI O157 SURVEILLANCE IN THE KEEWATIN

P.H.Orr

2/9/91

Because of the current outbreak of E. coli O157 in the Keewatin, all health units should be monitoring for the presence of diarrhoeal disease (especially bloody diarrhoea) in their community. These guidelines apply primarily to Coral Harbour, Repulse Bay, Chesterfield Inlet, Whale Cove and Sanikiluaq. Programs are already under way in Arviat, Baker Lake and Rankin Inlet.*

1. Each nursing station should keep a daily list (name and DOB) of all patients presenting with diarrhoea who meet the definition of a possible, probable or confirmed case (see enclosed page of definitions).
2. Use the enclosed guidelines for the Hx, P/E and lab work up of these patients.
3. Fill out pages 1 and 2 (up to and including "CASE TYPE") of the enclosed questionnaire on each patient.
4. FAX your list every day (prior to 6 pm if possible) to R. Brown at the KRHB in Rankin and to Dr. Lisa Lugtig at the Health Centre in Rankin (for computer data entry). FAX the questionnaires daily to Dr. Lugtig only.
5. If your community has a confirmed case (see definitions) fill out the entire questionnaire on the next 15 patients who present as possible or probable cases.
6. A public education campaign program is under way in all communities. If a confirmed

case is found in your community, we will assist you in control measures. These measures may include intensified counselling and environmental sampling +/- "voluntary isolation" measures.

7. If a confirmed case of E. coli 0157 is found in your community, use the enclosed guidelines for follow up.

*Baker data is being tabulated at present by Dr. D. Holton in Baker and being forwarded by her to R. Brown. Arviat will continue to send the data sheet that they are using to Lisa Lugtig for analysis and a copy to R. Brown.

Guidelines for the Clinical Evaluation of Possible or Probable E. coli O157:H7 Patients

P.H.Orr

2/9/91

Initial assessment for all possible or probable cases (see case definitions) includes:

1. Weight, BP, temperature (record po, pr or axillary), HR
2. Physical exam
3. Lab
   - Hg by finger poke
   - Urine dipstick: record protein and blood amount
   - Stool
     - send stool in container and mark requisition "C&S, R/O VTEC"
     - Keep a log of the patient names and CPL numbers (on the CP stickers) for stools sent.
     - If you suspect another cause of diarrhoea (eg. patient has been travelling and has greasy malodorous stools suggestive of giardia) you may also wish to obtain stools for O&P. You can obtain the CHC doctor's advice regarding other tests if you are unsure.
   - Sicker patients will need further tests including CBC and smear, electrolytes, urea, creatinine, and urine microscopy. If these patients are being sent to CHC these tests can be done there.

The approach to these patients is similar to other cases of gastroenteritis. Assess the

degree of dehydration if any and whether the patient is taking fluids. Patients who are already dehydrated and not taking further fluids will need to be sent out for intravenous therapy. The CHC doctors can give advice regarding IV therapy during transfer. ½ normal saline with D5W is used in Winnipeg, but the stations do not have it; therefore use ⅔:⅓. Patients with evidence of haemolysis (a recent drop in Hg, bearing in mind that many Inuit children have chronic iron deficiency anaemia) or new hypertension must also be referred to the hospital. The results of urinalysis (ie. degree of haematuria or proteinuria) must be assessed in conjunction with other clinical findings.

Patients taking fluids will need to have their deficits plus maintenance requirements fulfilled. Use gastrolyte for children.

The following formulas are used at the Children's Hospital in Winnipeg. Other formulas are also available.

Assessing degree of dehydration:

CHILD <1 YR	CHILD >1 YR	SIGN
5%	3%	No tears, dry mucous membranes
10%	6%	Skin turgor, sunken fontanelle, oliguria
15%	9%	Falling BP, RR

1. **Maintenance**

   100 cc/kg/day for the first 10 kg, then

   50 cc/kg/day for the next 10 kg, then

25 cc/kg/day for every kg over 20 kg weight

eg. a 15 kg. child needs 1250 cc of fluid/24 hours

2. **Replacing deficit**

% dehydration x body weight (kg) = deficit

Give half of the deficit over 6 - 8 hours, and also give the maintenance fluid as calculated above.

Follow up of E. COLI O157 Gastroenteritis and HUS

P.H.Orr

2/9/91

The enclosed data sheet can be used for recording follow up information. Recommendations for follow up are as follows:

A. **HUS Patients**

1. **Follow up - 1 week:**

Patients should be seen 1 week after return from hospital (CHC or Winnipeg). The visit should include a history (ask esp. about headache, diarrhoea, vomiting, lethargy, urine output), physical examination (include weight and BP), urinalysis and Hg (finger poke). Notify CHC MD if any abnormalities found. If no abnormalities found, see patient again at 60 days.

2. **Follow up - 60 day:**

a) Patient on the Canadian Paediatric Kidney Disease Reference Centre Study:

The Canadian Paediatric Kidney Disease Reference Centre is studying some Keewatin children with HUS. So far all the enroled patients have been from Arviat. The study has been coordinated by Elaine Orrbine. These patients should be seen in the Nursing Station by the nurse at 60 days after discharge from hospital. Form 2 of Appendix H should be filled in. Elaine Orrbine will supply the forms, which ask for measurements of height, weight and blood pressure. A urinalysis (micro and dipstick) should be done in the station if possible. Blood should be sent to CHC for haemoglobin, WBC, platelet,

urea and creatinine. Also 2 ml. of serum should be sent to HSC for antibody studies. Elaine will be giving Arviat the exact address.

The CHC doctor visiting the settlement at this time should also review the patient with the nurses. However, this may not be at exactly 60 days.

b) Patient not on the Canadian Paediatric Kidney Disease Reference Centre Study:

These patients should be seen as per the study patients, but will not have the 2 ml. serum sent to HSC and will not have a Form 2 filled out. However, the same Hx., P/E and other lab tests should be done.

If the 60 day visit is normal for these patients (study and non-study patients) they should be seen again at 1 year.

3. **Follow up - 1 year**

Patients should be examined again by the visiting physician at 1 year if the 60 day follow up was normal. The BP should be checked carefully, as well as urea, creatinine and urinalysis (micro and dipstick). If the urinalysis shows < 2+ proteinuria, a 24 hour urine is not required. If there is any evidence of renal impairment (eg. elevated BP, abnormal blood work, >2+ proteinuria or abnormal urine sediment), patients should be referred to a Paediatric Nephrologist in Winnipeg (Dr. Grim or Dr. Ogborn). It would be best if our physicians in Churchill and Rankin kept in close touch with the consultants in Winnipeg and the care is jointly shared.

4. If the 1 year visit is normal, patients should be seen yearly thereafter. Patients should be placed on the chronic disease register and children should be seen by the paediatrician

who visits the community.

5. The same clinical approach can be applied to adult patients who develop either HUS or TTP (thrombotic thrombocytopenic purpura). So far we have not seen complications in adult Keewatin patients.

B. **E. COLI O157 Patients (no HUS)**

1. Since these patients are at risk of developing HUS, they should be seen at 1 and 2 weeks after their first Nursing Station visit if this is possible. Target especially the confirmed and probable cases, according to the established definitions. It may not be possible to see all the "possible" cases. The nurses should try to take BP's and do a urinalysis. Obviously the sicker children will be followed more closely than this. Patients who continue to have diarrhoea or who appear to "relapse" should have repeat stools sent.

2. Patients who are found to have positive stools (either positive culture or verotoxin) should have weekly stools sent for VTEC culture until 2 consecutive samples are negative. Obtain these samples on all new confirmed cases of VTEC and also on any positives from the past 4 weeks if possible. This sample should be a swab which is dipped in the stool and then placed in transport media. The transport media used can be either Ames or Carey Blair media which has been sent to some stations by Cadham Lab or the Ames charcoal media which most nursing stations already have. Send the swab in media, with a Cadham Lab requisition labelled "VTEC Excretion Study" to Cadham Lab. Keep the specimen as cool as possible (eg. in lower part of fridge before sending and with ice pack if you have one during transport). Do not send the actual

stool specimen as we are only culturing for the organism in follow up, not looking for toxin. If you cannot get a stool specimen from a baby, you can try to obtain a rectal swab.

For diagnosis, continue to send the stool specimen (not swab) for VTEC culture and toxin.

This study (coordinated by Dr. Pam Orr) is important in order to plan control measures for your community.

3. Patients with diarrhoea matched to HUS patients in the KF study should have Form 2 filled out at 60 days, with the same blood work as the HUS patients have. Thereafter no formal follow up is required unless abnormalities are found.

E.coli O157: A Clinical Update

B. Tan

P. Orr

September 3, 1991

E. coli O157:H7 is a bacteria that can cause diarrhoea in humans. It has been known to cause outbreaks among children and the elderly. In most instances, the illness is mild, consisting of watery diarrhoea (which may have blood streaks or frank blood!), abdominal cramps, nausea and vomiting and mild fever. The symptoms may last upward of 5-14 days in adults, but usually shorter in children (3-9 days). Please note that this infection can occur in people of ALL ages, but seems to cluster in the very young and the very old. The illness is more common in the summer.

While other serotypes of E.coli are commonly found in the gastrointestinal tract of normal humans, this particular strain (O157:H7) is not usually found except in association with diarrhoeal illness. The O-number refers to the specific protein type on the bacterial cell wall, while the H-number refers to the protein type of the tail or flagella of the bacteria. This strain is known to produce two toxins called "verotoxins". Many experts consider these toxins to be the cause of the diarrhoea and the complication that is sometimes seen with this infection.

The organism is found in various foods, including beef, lamb, pork, poultry, unpasteurized milk and cheese and in contaminated water. It can be ingested through food or by the faecal-oral route through contact with persons who are excreting the organism. The latter occurs mostly through touching the hands (or diapers in the case of babies) of infected

individuals who have not washed after using the washroom. We are unsure how long the organism can live on the surfaces or wet objects such as towels; likely it can survive for minutes or hours. The organism is more likely to survive outside the body in warm moist environments. Saliva is not thought to be infective.

After ingesting the organism, it multiplies in the GI tract and produces toxins which cause diarrhoea. The incubation period is 3-8 days. It is possible that some individuals become infected but do not become ill. We do not know how often or why this occurs. Studies have shown that such people are asymptomatic and carry the organism in their stool. However most infected persons do become ill. They excrete the most bacteria and are most infective while they have diarrhoea. We do not know how long they continue to excrete the organism. For the purposes of this outbreak we are stopping "voluntary isolation" after a person has been free from diarrhoea for 3 days.

At least 1% of cattle herds are infected with this organism. During the slaughtering of cattle, the organism in the cow's GI tract can get on meat. If the organism is on the surface of the meat product such as steak, it will be killed by cooking the surface even though the interior may be pink. However in hamburger the organism is usually distributed throughout the meat which then must be cooked in entirety.

We do not now if caribou also are infected. So far our studies of caribou meat, caribou faeces, seal, char and goose are inconclusive. Two samples of caribou meat were positive but they may have been contaminated by people touching the meat. The organism can survive freezing. It is killed by microwaving food provided the package microwaving instructions are

followed.

There is no specific treatment, vaccine or cure for this infection. There is some evidence that antibiotics may make it worse, so they are contra-indicated. In particular, Septra/Bactrim may increase the production of toxin by the bacteria. Anti-motility drugs (such a Buscopan, Lomotil, Donnagel, Kaopectate) may also worsen the illness. Hydration should be monitored.

The diagnosis is made by either culturing the organism and/or detecting the toxin in stool. The specimen should be kept cool and sent to the lab as soon as possible. Since this infection can have significant complications, it is important to make a diagnosis. In the setting of an outbreak, all diarrhoeal illness should be treated as possible cases. Bloody diarrhoea is probably E. coli O157, but we have seen many (50%) positive stools that were not bloody.

It is estimated that between 5-10% of persons with this infection may develop a condition called the "haemolytic uraemic syndrome" (HUS). This typically arises about 6-7 day after the onset of the diarrhoea, but can be seen as early as the 2nd to 3rd day and as late as two weeks after the appearance of diarrhoea. It is important to remember that in some patients HUS arises AFTER the diarrhoea has resolved. It is thought that the toxins pass into the bloodstream and cause vasculitis (inflammation of blood vessels) in the kidney, GI tract, heart, brain, liver, spleen and other organs.

Typically the patient becomes lethargic or less active. There may be a history of poor urine output. The patient may appear pale and mildly jaundiced because of haemolytic anaemia. Children may develop bruises or petechiae on their extremities because of associated

thrombocytopenia. In a few rare instances the patient may develop seizures. Finally in extreme situations, the patient develops acute renal failure and will need dialysis to sustain life. It is clear then that this syndrome, albeit uncommon, should be recognized quickly and the child transferred to a tertiary centre in the event that further treatment and dialysis are necessary. NOTE: The patient has FULL spectrum HUS if he/she has the triad of haemolytic anaemia, thrombocytopenia and renal failure. Some patients do not develop the whole picture, perhaps with very mild anaemia and thrombocytopenia but no renal failure. Others develop all three features but of VERY SHORT duration only. However a few develop the triad very rapidly and require extensive and prolonged treatment, eg dialysis over several weeks. There is no way to predict which course will be followed.

Guidelines for the assessment and follow-up of patients are included in your information package. If you have any questions please contact the CHC physicians.

HAEMOLYTIC UREMIC SYNDROME
SURVEILLANCE DATA
KEEWATIN DISTRICT

B. Martin, M.D.
D. Manuel, M.D.
P. Orr, M.D.

PART I. IDENTIFYING INFORMATION

Name:_____ Sex: [M] [F] D.O.B (y/m/d): __/__/__

Address Initial:_____ Subsequent:_____

N.W.T. # _ _ _-_ _ _ _ C.H.C. # _ _ _ _ _

PART II. H.U.S -- INITIAL OCCURENCE

Date of Diagnosis (y/m/d/): 19__/__/__ Age at Diagnosis: ___yrs.___mos.

Treatment Centre: C.H.C. [ ] H.S.C. Winnipeg [ ] Other [ ]_____

Associated Disease: E. Coli 0157:H7 confirmed [ ] suspected [ ]
repeat vero-toxin serology [+ve] [-ve]
other _____

Management: supportive only [ ] transfusion [ ] furosemide challenge [ ]
peritoneal dialysis [ ] hemodialysis [ ]

Complications: C.N.S.: seizures [ ] other [ ]
C.V.S.: congestive failure [ ] hypertension [ ] myopathy [ ]
G.I. : perforation [ ] stricture [ ]
G.U. : renal failure [ ] --> peak BUN _____ peak Cr. _____
Hematologic: anaemia < 7 gm. [ ] other [ ] _____

Participant in CPKDRC-HUS Study[1] [ ] I.D. # _ _ _ _ _ _

PART III. SURVEILLANCE DATA[1]

Date	Time since onset	BP[1]	Wt. kg.	Hgb	MCV	BUN	Cr	Drug Therapy[1]

.....2

NAME: _____

Page___of___

PART III. SURVEILLANCE DATA[3] (CONTINUED)

Date	Time Since Onset	BP[4]	Wt. kg.	Hgb	MCV	BUN	Cr	Drug Therapy[5]

1. Initial recommendations are that Vero-toxin antibody determination should be done at the time of initial HUS diagnosis and two months later.

2. CPKDRC-HUS Study refers to the Canadian Pediatric Kidney Disease Reference Centre Haemolytic Uremic Syndrome Study which commenced in 1991 to study the epidemiology of HUS. The CPKDRC is based in Ottawa at the Children's Hospital of Eastern Ontario.

~~3. Surveillance has been recommended at three monthly intervals for three years, six monthly for two years then yearly thereafter.~~

4. Blood pressure should be measured with a cuff width that is equal to two-thirds of the distance from the individual's elbow to shoulder, as measured on the outer aspect of the arm.

5. Folic acid and Vitamin E are recommended until the HGB is within the normal range; iron is recommended if the MCV is < 80.

CHAPTER 6

LABORATORY CENTRE FOR DISEASE CONTROL (LCDC REPORTS)

Respectfully submitted:

Donna Holton MD FRCPC

Field Epidemiologist, LCDC

Ben Tan MD FRCPC

Field Epidemiologist, LCDC

John Spika MD

Director, Bureau of Communicable Disease Epidemiology, LCDC

Jamie Hockin MD M Sc

Chief, Field Epidemiology, LCDC

Escherichia coli O157:H7 Outbreak in Arviat, NWT
Report date: 14 Aug, 1991

Summary

From 4 June 1991 and continuing through the present time, an outbreak of diarrhoea caused by Escherichia coli (E. coli) O157:H7 occurred in the Inuit community of Arviat, Northwest Territories (NWT). There have been 244 cases of diarrhoea reported thus far, 86 of which are culture proven cases of E. coli O157:H7. One death has occured. An investigation was carried out by the Field Epidemiology division of LCDC in July 1991, but was unable to identify the original source(s) by which the bacteria was introduced into the community. However, there was evidence of secondary person-to-person spread which is contributing to the ongoing outbreak. Recommendations were made at the end of the investigation to help control the outbreak and to continue surveillance for this disease in Arviat as well as other communities in the Keewatin region.

Background

On 8 July 1991 LCDC was notified of the outbreak in Arviat. At that time there were 32 cases of bloody diarrhoea, 8 of which were confirmed positive for E. coli O157:H7. There was a patient who had developed the haemolytic uraemic syndrome (HUS), a known complication of E. coli O157:H7 infection. This child had been medivaced to the Winnipeg health centre for further care. A request was made by Dr. Carolyn Pim, the Territorial Epidemiologist in Yellowknife, for LCDC's participation in carrying out an epidemiological

investigation in Arviat. The goal was to try to ascertain the source and the reason(s) for spread of the infection in the community.

Dr. Donna Holton and Dr. Ben Tan were the field epidemiologists from LCDC sent to Arviat. Dr. Holton was there from July 12-15, while Dr. Tan remained on site from July 11-20. The LCDC epidemiologists were joined by Dr. Pim for the first two days July 11-12. Other members of the investigative team included two environmental health officers (EHO) from NWT, Mr. Robert Kielly and Mr. Jack MacKinnon.

Methods

Several tasks were carried out by our team in Arviat:

1. Case definitions were established:

   A possible case was defined as one having two or more loose stools a day. A probable case is one who has had at least one (visibly) bloody stool. A confirmed case is one whose stool culture is positive for verotoxin and/or E. coli O157:H7. An HUS case is one who has developed acute renal failure, haemolytic anaemia and thrombocytopenia.

2. Patient charts were reviewed to ascertain clinical signs and symptoms plus relevant laboratory tests.

3. Probable and confirmed cases were interviewed at the nursing station or at their homes, with an emphasis on the history of foods consumed during the week prior to illness, as well as contact with other ill cases in the community.

4. In conjunction with the EHO's, food and water samples were collected from case

households, from the community freezer and from the two major retail stores; the Northern store and the Co-op. These samples were sent to Cadham provincial lab in Winnipeg for verotoxin assay and culture for E. coli O157:H7.

5. A case control study was conducted, involving 14 cases and 14 age and sex matched controls, looking specifically for differences in their food preferences and water sources. The controls were chosen from neighbouring houses, with a requirement that there be no cases of diarrhoea in the control household in the week preceding the case's onset of symptoms.

6. An arrangement was made with the Dept of Renewable Resources, NWT to sample caribou faecal material around the Arviat area and culture for verotoxin and E. coli O157:H7. This was to help test the hypothesis that the E. coli may be carried in the intestinal tracts of caribou and cause human infection if caribou meat contaminated by the bacteria is eaten raw. The samples were sent to the LCDC Microbiology laboratory care of Hermy Lior.

7. An in-service session was held for the medical personnel in Arviat about infection caused by E. coli O157:H7 and the attendant complications.

Results

At the time of LCDC's investigation in mid-July, the outbreak consisted of only 70 cases. However by August 14th, the outbreak had increased to 244 cases.

A. Clinical

Of the 244 cases with diarrhoea, 86 (35%) were confirmed, 24 (10%) are probable cases and 134 (55%) are possible cases. It is likely that these proportions will change as culture results become available, when either E. coli O157:H7 or other pathogens are discovered. The ages of patients ranged from 1 month to 77 years. Forty-eight% of the total number of cases was under 5 years of age. Consequently the attack rate of diarrhoea was highest in the 0-4 year age group (52%). It was lower in the 5-9 year (23%) and over-60 year (16%) age groups. The attack rate was lowest among those between 20 and 60 years of age (6.7%). The single death occured in a six year old girl.

Roughly one-third (34%) of all patients had bloody diarrhoea. A history of bloody diarrhoea, however, did not increase the yield of a positive E. coli O157:H7 culture, since 43% of the confirmed cases actually occurred in patients with non-bloody diarrhoea. Thirty-six patients were medivaced to Churchill or to Winnipeg for further care. Ten patients developed HUS (11% of confirmed cases). One patient has died from complications of HUS as of 14 Aug, 1991.

In the statistical analysis of the first seventy patients, there were no clinical features that predicted the development of HUS in infected patients. Although antibiotics were prescribed either prior to or for treatment of the diarrhoea in 61% of the patients, there was no association of either Amoxil nor Septra use with subsequent development of HUS.

B. Contact tracing

This was an extremely difficult task as visits by people between houses is very common

in the community. In some instances overnight stay in friends' or neighbours' houses occurs. It was not possible to define a consistent trend in the spread of diarrhoea from one household to the next. Nevertheless, in a few examples, there was a definite and consistent temporal sequence of diarrhoea cases between patients in close contact with each other (eg. between cousins who spend time together and between a baby-sitter and her charges).

C. **Food Practices**

It was clear from the study that roughly 60% of cases (and their household members) consume food raw in one form or another. Most common was frozen caribou, eaten like a "popsicle" without thawing or cooking. Caribou is shot by male hunters and eviscerated on the land. The liver and heart may be eaten raw on site and the meat then brought back to the community. Hunting goes on through the year, although most hectic during winter when travel by skidoo facilitates transport. The time period from shooting to storage in the freezer varies from 1 day to several days. In many instances the meat is shared not only among household members but with other unrelated families as well. It is noted that hand washing and cleaning of knives are not standard practice before handling the meat in many households. In a few households the meat is not stored in the freezer but kept on the floor for variable periods of time. These households frequently have young children who may inadvertently handle the meat. Children as young as nine months may be fed raw caribou meat as well.

Only 2 out of the 35 cases interviewed admitted to eating raw ground beef/hamburger meat. The remainder indicate that they cook it by frying or heating in the oven. Ground beef is used most frequently in the summer time when caribou are scarce in the vicinity. The ground

beef is obtained at the retail stores who in turn ship them by train and air freight from Manitoba.

D. **Microbiology of food and water samples**

Samples of water from the municipal reservoir, the creek and from selected households did not reveal E. coli O157:H7 on culture. However water samples from two households had heavy coliform counts. Food samples taken at random from retail stores, predominantly ground beef and hamburger patties, were also negative for verotoxin and bacteria. Caribou, not frozen, samples from two case households were positive for E. coli O157:H7. It is possible that the meat may have been secondarily contaminated by infected household members. Other samples of goose, seal and beluga taken from selected households were all negative on culture.

E. **Case control study**

The case control study did not implicate any specific food or water supply as the source of E. coli O157:H7. More specifically there was no association of raw caribou, hamburger or ground beef intake with diarrhoea in this epidemiological study. Two water sources are used for drinking; chlorinated water from the municipal reservoir and untreated water from a nearby creek. Both sources were not epidemiologically associated with the diarrhoea.

F. **Caribou herd sampling**

The Dept of Renewable Resources, NWT shot ten caribou from the dominant (Kaminuriak) herd in the vicinity of Arviat and sampled the intestinal contents and meat. None revealed the presence of verotoxin or E. coli O157:H7 on culture.

Discussion

In this community of approximately 1340 inhabitants, the occurrence of diarrhoea in 244 persons (18% of the population) constitutes a large outbreak. However it should be noted that at the present time only 86 cases have been confirmed positive for E. coli O157:H7 or verotoxin. This means that a portion of the remaining 158 cases of diarrhoea may not be due to this particular bacteria. There is about a one week lag period between obtaining stool specimens and final lab reporting because they have to be sent to Cadham lab in Winnipeg from Arviat. Thus it is likely that more cases will be confirmed in the near future.

While it is not clear whether there is any difference in the incidence of diarrhoea in the community this year compared with previous years, it is evident that the occurrence of bloody diarrhoea is unusual. The only pathogen that appears to be endemic to the Region is Giardia lamblia, which rarely causes bloody diarrhoea. Salmonella and Shigella infections are also uncommon in the community. E. coli O157:H7 has never been specifically looked for in the past, thus it is unclear if this is the first occurrence of infection in the region.

The high attack rates in the very young and the elderly is not unusual and is consistent with the pattern in other outbreaks. The 11% incidence of HUS is rather high but it may be due to the fact that many cases (denominator) are as yet unconfirmed and the proportion is in fact much lower. Usual reported incidence of HUS in E. coli O157:H7 infection is between 5-10%.

While the case control study did not implicate any particular food or water source, it should be pointed out that it was carried out about six weeks into the outbreak. This could

introduce recall bias. Also Arviat is a fairly homogeneous community, in that the practices between households are very similar. The water and food sources are one and the same. It was difficult to find control households where there were no cases of diarrhoea and the small numbers accumulated does decrease the power of the study.

Food sampling was done to help rule out an ongoing source of bacteria. Results were negative except for the two caribou samples. It is not clear whether these were secondarily contaminated, but does suggest that it may play a part in the dissemination of the infection (especially if consumed raw). Sampling from the caribou herd is insignificant as only ten caribou were obtained, out of a herd of over 200,000! It is highly likely that we may not discover the original source of the bacteria. If it was in a particular food in June, it has already been consumed. Even if ground beef in Arviat is found to be positive for E. coli O157:H7, it would be difficult to interpret its significance since about 2% of ground beef in retail stores in Manitoba and Alberta are positive for the bacteria. All that can be said is that it may contribute to illness if not killed in the cooking process. A similar argument can be made about water, especially since infected cases may contaminate their water supply in open tanks, which then is used for drinking.

Finally the evidence from contact tracing and food practices suggests that secondary faecal-oral (person to person) spread may be playing a significant role in this outbreak. Additional evidence comes from phage typing by our LCDC lab of the E. coli O157:H7 from 58 cases (involving about 46 different households). All are phage type 32 which suggests that the same strain is circulating in the community.

Recommendations

At the time the LCDC investigation in Arviat concluded July 19th, the following suggestions/recommendations were made:

1. There would be continued surveillance for further cases of E. coli O157:H7 in Arviat using our case definitions and ongoing collection of stool cultures when appropriate. A system of upkeeping the list of patients on Epi Info computer program was left with the health unit. This was done because it was possible that the outbreak would progress until control measures took full force.
2. A medical bulletin was prepared with Dr. Carolyn Pim to disseminate information about E. coli O157:H7 infection and to alert health units in surrounding communities in the Keewatin Region. It was conceived that cases might appear in other communities because of frequent air travel between communities.
3. There would be continued collection of caribou faecal material by Renewable Resources (taken from the ground fresh rather than shooting more animals) to screen for E. coli O157:H7 carriage. These samples would be sent to Hermy Lior in our LCDC microbiology lab. The need for further food sampling from households would be assessed on an individual basis but is not likely to be helpful as indicated by our case control study and other observations.
4. A door to door campaign was begun to teach people in the community about the dangers of this infection and the method of spread. Infection control measures, specifically hand

washing, cooking foods and boiling drinking water are to be encouraged. A request was made of the Dept. of Health in Yellowknife to provide posters explaining these measures to be posted up in places of community gathering. Because of the need for cultural sensitivity, it was recommended that this teaching be done by trained public health personnel, in cooperation with the community health representative in Arviat. This teaching and dissemination of information would be supplemented by radio "call-in" shows where community members could ask questions and participate in the campaign.

Further measures taken

By Aug 14th it was clear that the outbreak had expanded far beyond the original 70 cases during our investigation on site. This was despite extensive door to door teaching by the health unit in Arviat. The health unit was giving out free soap bars to homes that could not afford them. At this time the idea of a medical "open house" was suggested, to be held by the health unit, where there would be displays showing pictures/slides of the bacteria and models of how disease is spread. There would be a hand washing station and also a station to show how disinfectant solution could be mixed to clean the house. School children would be involved in preparing posters and encouraged to bring family members. The goal is to engender enough understanding of the high attack rate among children and the elderly and to encourage the measures necessary to stop the spread of disease. At this time there was initial consideration by the Keewatin Health Board to ask patients with diarrhoea to voluntarily refrain from visiting

other households (voluntary "isolation"). It is hoped that these measures will help in preventing further expansion of the outbreak.

Ben Tan, MD, FRCP(C)

Field Epidemiologist

Summary of E. coli O157 Outbreak at Baker Lake

Dr. Donna Holton

Field Epidemiologist, LCDC

October 7, 1991

On August 8, 1991, the Laboratory Centre for Disease Control (LCDC) was invited by the Keewatin Regional Health Board (KRHB) and the Northwest Territories (NWT) Epidemiologist to assist in an E. coli O157 outbreak investigation in Baker Lake, NWT. Details of the invitation were discussed August 9, 1991 and Dr. Ben Tan arrived at Baker Lake, August 13, 1991.

The investigation team at Baker Lake included Barbara Lashley, RN, Elizabeth Farrelly, RN, Lyne Bujold, RN, Herve Bujold, RN, Ann Cholod, RN, Joan Killulark, Community Health Representative (CHR), Robert Kielly, Environmental Health Officer from Rankin Inlet, Diane Thompson, Assistant Head Environmental Health from Yellowknife, Julie Sanguins, Health Promotion Officer from Yellowknife, Dagmar Philbrook, Public Health Nurse from KRHB, Ben Tan, MD, from LCDC (August 13-26), John Spika, MD, from LCDC (August 23-29) and Donna Holton, MD, from LCDC (August 26 -September 16).

Situation

Baker Lake is community of 1400 people located in the interior of the Keewatin District. Although Baker Lake is only linked by airplane to other communities in the Keewatin district,

g. the door to door literature campaign.

LCDC was also involved in the following activities outside of Baker Lake:

1. participation in developing case definitions for the NWT outbreak of E. coli O157,
2. development of a surveillance protocol for Keewatin communities not yet affected by E. coli O157,
3. participation in the food/water questionnaire conducted in Rankin Inlet,
4. teaching Epi Info to Dr. Lisa Lugtig, Rankin Inlet.

Results and Conclusions of Studies

From July 1 to September 15, 1991, at least 87 people in Baker Lake had a diarrhoeal illness. Fifteen (17%) persons presented with bloody diarrhoea; 72 (83%) persons had non-bloody diarrhoea. Ten (11.5%) persons, 5 persons with bloody diarrhoea and 5 persons with non-bloody diarrhoea, had laboratory-confirmed E. coli O157 disease. E. coli O157 or verotoxin was not detected in 10 (67%) patients who presented with bloody diarrhoea. The low rate of confirmed disease was probably due to delays of up to 6 days before the sample reached the laboratory, shipping samples to the laboratory in an unfrozen state without the use of transport media and delays in obtaining stool samples after initial presentation.

Sixty-two percent of cases occurred in children less than 4 years of age. Forty-four (51%) males and 43 (49%) females presented with diarrhoea. The epicurve illustrates a cyclic pattern with low numbers of people presenting with diarrhoeal illness followed by days with higher numbers of people presenting with diarrhoeal illnesses (Appendix 3). This pattern did

not coincide with radio announcements and may be related to infected individuals entering or returning to the community.

Although the first culture confirmed case did not occur until July 15, 1991, the outbreak likely began in June. The chart review identified a child who presented on June 6 with bloody diarrhoea but who failed to obtain a stool specimen for culture. Bloody diarrhoea was an unusual complaint in the community of Baker Lake prior to the E. coli O157 outbreak. In April, May and June 1991, 6.0-9.3% of children less than 4 years of age presented with diarrhoea (Appendix 2). In 1989 and 1990, 0.7-3.2% of children under the age of 4 years presented to Baker Lake Nursing Station with diarrhoea in April, May and June (OR 4.03 CI 2.05-7.97, p=0.00001). However, when analyzed by individual month, only June 1991 had a significantly higher rate of diarrhoeal presentation (OR 11.38 CI 2.49-72.21, p=O.00006).

The source of the outbreak could not be identified in the LCDC investigation since our investigation started in mid August and the outbreak probably began in early June. However during August and September the major method of transmission appeared to be person-to-person spread. This was supported by the relational maps that linked many of the cases to each other and the finding that cases were significantly more likely than controls to have visited outside the home in the under 4 case-control study (match OR = 12.0 CI 1.26-114.01, p=0.025).

The public health education provided by the staff at the nursing station appeared to decrease the occurrence of diarrhoeal disease in Baker Lake. Sixty percent of people reported washing their hands more frequently. Although 72% of people reported washing their hands after using the toilet and 75% reported washing their hands after diapering a child, only 41%

of people reported washing their hands before eating.

The under 4 case-control study showed that cases were significantly more likely than controls to have presented to the nursing station with a previous history of diarrhoea from December 1988 to June 1991 (OR undefined, CI 1.23-997, p=O.01).

The food/water risk questionnaire and under 4 case-control study did not reveal high risk items.

A second peak of children under 4 years of age presented with diarrhoeal illnesses in December 1990 (17.2%) and January 1991 (11.5%). The Keewatin Regional Health Board is reviewing the environmental samples obtained at this time to determine if any pathogen was identified.

Recommendations

Recommendation 1-7 were presented at the sign out teleconference September 16, 1991.

1. Development of Public Health education programs for the community by the Public Health Nurse and the Community Health Representative should continue. These could include posters in public places, radio talk shows, classes at school and open house programs. In addition to messages about hand washing, diapering of non-toilet trained children when they have diarrhoea, proper handling of diapers and cleaning of the diapers change areas, they should also encourage the proper handling and cooking of hamburger.

2. Development of an education program targeted to families with children seen at the

Nursing Station with diarrhoea should be seriously considered. This could include teaching by the nurse at the time of the visit for diarrhoea, a home visit by the CHR as soon as possible after the visit to the Nursing Station and follow-up visits by the CHR to the home at 1 to 3 month intervals. The impact of this program could be assessed by comparing the number of cases of diarrhoea seen at the Nursing Station in the coming year compared to the 1989 and 1990 data.

3. Maintenance of a surveillance system for diarrhoea and bloody diarrhoea should continue. All cases of diarrhoea should submit a stool specimen for culture. New cases of diarrhoea should have cultures obtained and placed in stool specimen containers. A request for examination of the specimen for E. coli O157 should be written on the requisition.

   If E. coli O157 is not isolated from any patient for a 2 month period, the routine submission of cultures should be reevaluated. However patients with bloody diarrhoea should always have a specimen submitted with a request for E. coli O157 to be performed.

4. Development of a simple surveillance system for diarrhoea in children less than 4 years of age should be strongly considered. This could include the collection of names or number of cases of diarrhoea seen by the nursing staff. This information could be recorded either as a line list or on a graph posted in the reception office. New nursing staff will need to be informed about the surveillance system and the definitions of diarrhoea that are being used.

5. Continuation of the follow-up of patients from whom E. coli O157 has been isolated or who develop haemolytic uraemic syndrome as per the "Excretion Study" protocol is encouraged.

   Unlike specimens obtained from new cases, stool specimens from patients in the follow-up study should be swabbed, the swab placed in Amie's transport media and kept as cool as possible. Only the swab should be sent to Cadham Laboratory for culture. If a stool specimen can not be obtained, a rectal swab will be acceptable.

   A swab in Amie's transport media is NOT sufficient if examination for ova and parasites is required.

6. Continuation of the voluntary isolation program for children less than 4 years of age with diarrhoea is encouraged. This program should be reassessed if E. coli O157 is not isolated from any patient for a 2 month period.

7. The community of Baker Lake should be informed of the results of any environmental samples that were taken in this community and the results of the proposed Caribou faecal sampling study.

8. The source of the outbreak of E. coli O157 could not be identified. The initial source may have been hamburger, caribou or people entering/returning to the Keewatin communities while incubating E. coli O157. The southern Canada E. coli O157 exhibits a highly seasonal pattern with peak rates occurring from June to early September and a nadir from mid September until May. If E. coli O157 re-occurs next year in the Keewatin District, it would be very important to obtain food samples from the initial

cases to try to determine which one of the several suggested hypothesis is correct.

1. All members of the community should be encouraged to continue with the current recommendations regarding hand washing, how to clean diapering areas, diapering children, and cleaning counter tops, bathrooms and floors.

2. Any child who is less than 4 years of age who presents with diarrhoea should be kept at home until three days after the diarrhoea stops.

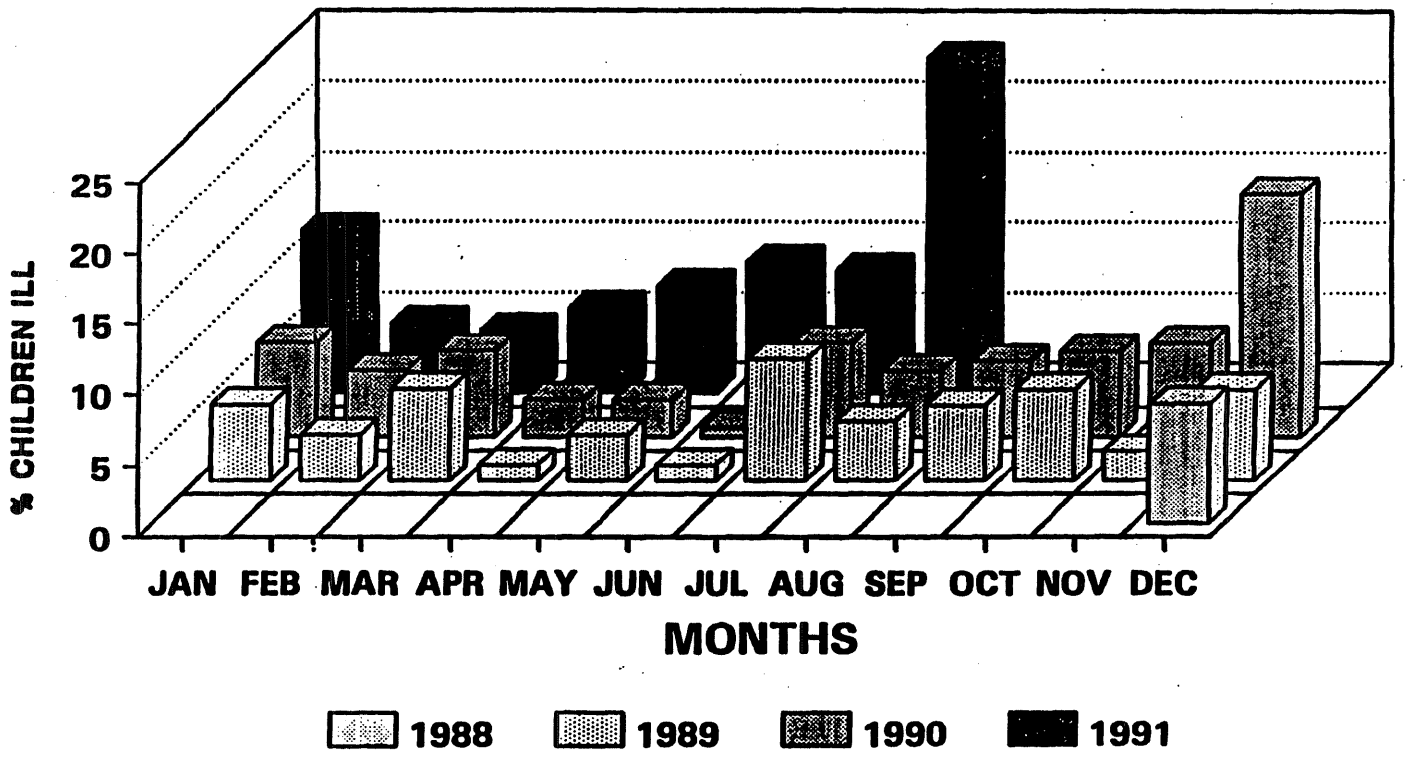
   Specifically, the child:

   1. should not visit cousins
   2. should not visit grandparents
   3. should not visit friends
   4. should not be taken to public places such as the store, church or arena

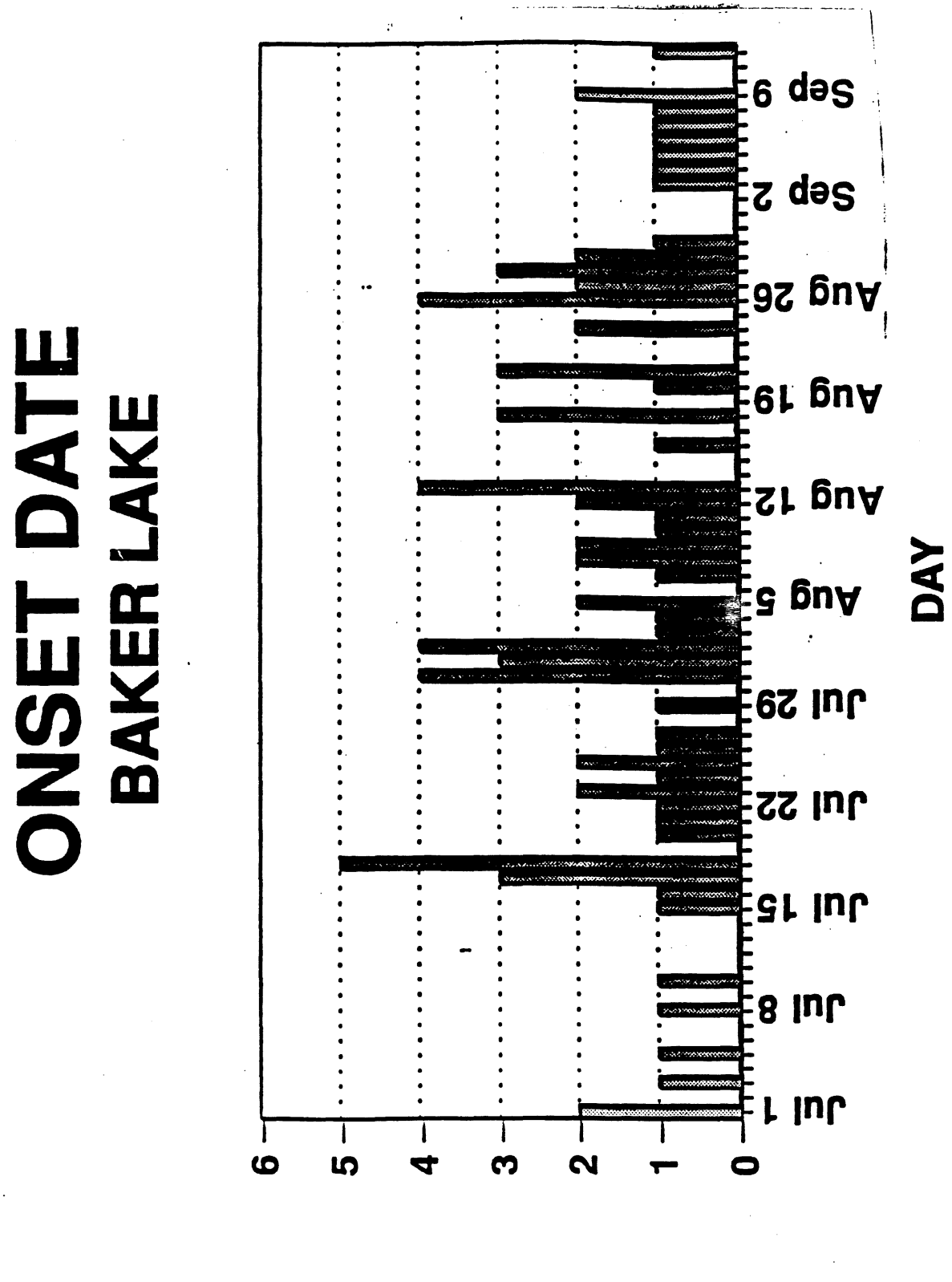
   If the child is not toilet trained, the child should be diapered. Soiled diapers should be disposed of immediately into a closed garage bag.

3. Children less than 4 years of age should not visit the homes of any child who has diarrhoea.

DIARRHEAL PRESENTATIONS
CHILDREN UNDER 4 YEARS OF AGE



Appendix 2


ONSET DATE
BAKER LAKE
Jul 1
Jul 8
Jul 15
Jul 22
Jul 29
Aug 5
Aug 12
Aug 19
Aug 26
Sep 2
Sep 9
DAY
0
1
2
3
4
5
6

APPENDIX 3

CHAPTER 7

A CASE-CONTROL STUDY OF CHILDHOOD HAEMOLYTIC URAEMIC SYNDROME (HUS) AND E. COLI O157:H7 INFECTION DURING AN OUTBREAK IN ARVIAT NORTHWEST TERRITORIES CANADA

A Case-control Study of Childhood Haemolytic Uraemic Syndrome (HUS) and E. coli O157:H7 Infection During an Outbreak in Arviat, Northwest Territories, Canada:

Elaine Orrbine, Research Coordinator, CPKDRC*, Ottawa; Peter C. Rowe, M.D., FRCPC, Johns Hopkins University, Baltimore; Malcolm R. Ogborn, M.D., FRCPC, Winnipeg Children's Hospital; George Wells, Ph.D., University of Ottawa; Hermy Lior, M Sc, LCDC**, Ottawa; Wendy Winther, Cadham Provincial Laboratory, Winnipeg; Douglas Manual, M.D., FRCPC, Churchill Medical Centre, Churchill, Manitoba; Peter N. McLaine, M.D., FRCPC, Director, CPKDRC**, Ottawa

* Canadian Paediatric Kidney Disease Reference Centre

** Laboratory Centre for Disease Control

Introduction

Arviat (formerly Eskimo Point) is an Inuit community with a population of approximately 1,300, situated on the Western border of Hudson's Bay. Housing is modern and fresh water is drawn from a reservoir 3 km west of town. Approximately 200 homes have pump-out septic tanks, from which liquid sewage is transported to a lagoon 3 km southeast of town.

The community of Arviat experienced an outbreak of E. coli O157:H7 gastroenteritis during the summer of 1991. The outbreak provided a unique opportunity to examine risk factors for HUS and gastroenteritis in Inuit children, and to see whether these risk factors differed from those identified among children in the more heavily populated areas of Canada. The Canadian

Paediatric Kidney Disease Reference Centre (CPKDRC) was invited to study this outbreak after several children from Arviat were transferred to the Winnipeg Children's Hospital for treatment of their HUS.

Outbreak Data

The first child from Arviat with O157:H7 gastroenteritis was identified on June 24, 1991 and the last stool culture positive for O157:H7 was submitted on October 16, 1991. During this period, the organism was isolated from stool cultures in 80 children less than 15 years of age (Figure 1).

Inclusion Criteria

To examine risk factors for HUS in this population we initiated a case-control study at the midpoint of the outbreak. Children with HUS were eligible for enrolment in this study if they were Arviat residents less than 15 years of age, had E. coli O157:H7 isolated from a stool specimen at the time of the HUS, and the diagnosis of HUS had been confirmed by a paediatrician or a paediatric nephrologist. Gastroenteritis controls were matched by age and gender to the HUS case. Each control had E. coli O157:H7 cultured from stool and no clinical evidence of HUS. Healthy controls were also matched by age and gender to the HUS case. Healthy controls were eligible if they had no evidence of vomiting or diarrhoea in the 2 weeks before the interview and no history of E. coli O157:H7 on stool culture. They were selected without knowledge of socioeconomic status from a roster of all children in the community. Potentially eligible children were contacted in alphabetical order from the roster,

and those whose parents agreed to participate were included as healthy controls.

Methodology

The study began after 13 children had been identified with HUS. Interviews with the parents of these children were conducted between the 9th and 17th of August, within 1.5 months of the onset of the HUS. Interviews with the matched controls for these 13 HUS patients were conducted during the same week. These interviews were conducted in English with translation from Inuktitut when necessary performed by **Laureen Pameolik Angalik**, an Arviat resident who had been recruited as a research assistant. Six patients developed HUS between August and October and were enroled prospectively. Children who developed HUS within this outbreak are shown in Figure 2.

Study Questionnaire

All interviews were conducted face-to-face in the family's home. The study questionnaire solicited information on **travel, food, water sources, exposure to other family members with diarrhoea, and demographic data.** Questions about food and other exposures referred to the period 7 days before the onset of diarrhoea in the HUS and the gastro patients, and to 7 days before the interview for the healthy controls.

CHARACTERISTICS OF HUS

Nineteen HUS patients met eligibility criteria for the study (11 male, 8 female). The median age was 2.9 years (range, 11 months - 6.5 years). Seventy-four percent of children with HUS were less than 4 years of age. The median length of stay in the hospital was 9 days

(range, 4 - 23 days). Five of the 19 children required dialysis. The severity of HUS in this study was comparable to that seen in other parts of Canada and one child died.

CLINICAL FEATURES

HUS patients and those with uncomplicated gastroenteritis did not differ on any of the questionnaire items except those related to severity of illness. Patients with HUS were more likely to have bloody diarrhoea (95% vs 53%, $p < 0.01$), vomiting (74% vs 26%, $p < 0.01$), irritability (84% vs 21%, $p < 0.001$), lethargy (74% vs 0%, $p < 0.0001$) and oliguria (84% vs 21%, $p < 0.001$).

CLOSE CONTACTS WITH DIARRHOEA

When all three groups were compared, the most striking finding was the rate of diarrhoea in the close family contacts of the patients with HUS or uncomplicated gastroenteritis. The median size of the families was similar in all 3 groups (6 individuals in the HUS and gastro groups and 5 in the healthy controls, $p = 0.83$). **However, the proportion of HUS patients and those with gastroenteritis who were exposed to at least one other household member who had diarrhoea in the 7 days before the onset of the GI symptoms was significantly different from the healthy controls (74% vs 16%, $p < 0.01$).**

EPIDEMIOLOGIC FEATURES

Two other differences were noted between the groups with regard to travel and socioeconomic status. Healthy controls were significantly more likely to have camped outside the community in the 7 days before the interview than were patients with HUS or uncomplicated

gastroenteritis (58% vs 8%, p = 0.002). In addition, children with HUS or O157:H7 gastroenteritis were more likely to live in families with an unemployed father or single mother, suggesting that lower socioeconomic status was a risk factor for infection (50% vs 5%, p < 0.001).

FOOD AND OTHER EXPOSURES

Specific items identified in published outbreaks as risk factors for E. coli O157:H7 were not implicated in this outbreak. The 3 groups had similar rates of exposure to antibiotics, to sources of water, and to foods such as ground beef, hot dogs, and chicken. Exposure to foods traditionally consumed by the Inuit during the summer, including char, caribou, mucktah (whale blubber), and seal, was similar for the 3 groups (Figure 3).

CONCLUSIONS

This study adds to the growing evidence that close contact with an individual with diarrhoea is an important risk factor for childhood E. coli O157:H7 infection and for HUS. Although our results do not exclude a shared source of exposure to O157:H7, such as a contaminated water supply, **the more reasonable explanation is that person-to-person transmission was the primary means of acquiring infection once the organism was introduced into this isolated and relatively closed community.**

Among the factors measured in this study, only the severity of the illness appeared to influence whether a child infected with O157:H7 went on to develop HUS. Further work is needed to define the host factors that may contribute to susceptibility to HUS in Inuit and non-

native Canadian children.

In other parts of Canada, a higher socioeconomic status appears to be a risk factor for developing HUS for reasons that may relate to the age at first exposure or the frequency of exposure to verotoxigenic E. coli. However in Arviat lower socioeconomic status, as reflected in a higher rate of unemployment and more single mothers, was a risk factor for developing both HUS and E. coli O157:H7 gastroenteritis. We observed informally that socioeconomic status was directly related to hygienic practices in the home, and to such factors as shared eating utensils.

Our findings suggest that increased attention to hygienic measures during an outbreak is important to reduce the interfamilial spread of infection from adults to children who are at the greater risk for HUS.

This study would not have been possible without the support, guidance and understanding of the following individuals:

Sanjay Sareen: Research Assistant: Winnipeg

Laureen Pameolik-Angalik: Research Assistant: Arviat

Arviat Nursing Station:

Nuri Sinuff, RN

Bev Lorencz, RN

Helen Klugston, RN

Gerry Pfleuger, RN

Wendy Murphy, RN

Hamlet Council, Arviat: Ralph King

Health Committee, Arviat: Linda Pemik

Adult Education, Arviat: Karen Illnik

Churchill Medical Centre: Charlene Catieller, Microbiology

Keewatin Regional Health Board:

Rosemary Brown, RNO

Robert Kielly, Sr. E.H.O.

Dr. Bruce Peterkin

Pierce Brewster, E.H.O.

NWT Government:

Dr. Carolyn Pim

Dr. Ian Gilchrist

Health Sciences Centre, Winnipeg:

Dr. Pamella Orr

Dr. Michael Moffat

Cadham Provincial Laboratory:

Dr. Greg Hammond

Dr. Trevor Williams

Dawm Colby

Anna Lutyj

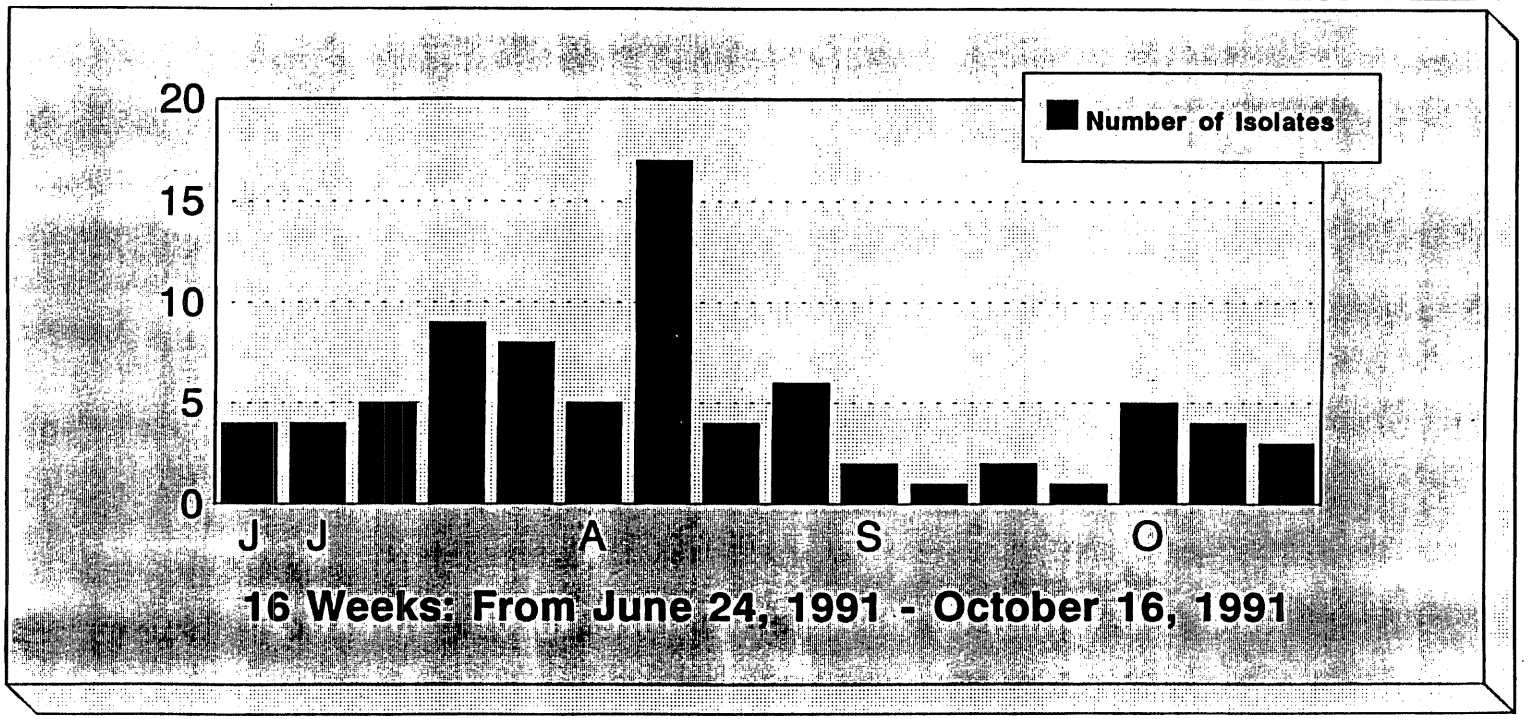
Clinical Microbiology Technologists

Laboratory Centre for Disease Control: Dr. Ben Tan

Isolation Dates of Children < 15 Yrs. With E.coli 0157:H7 Infection

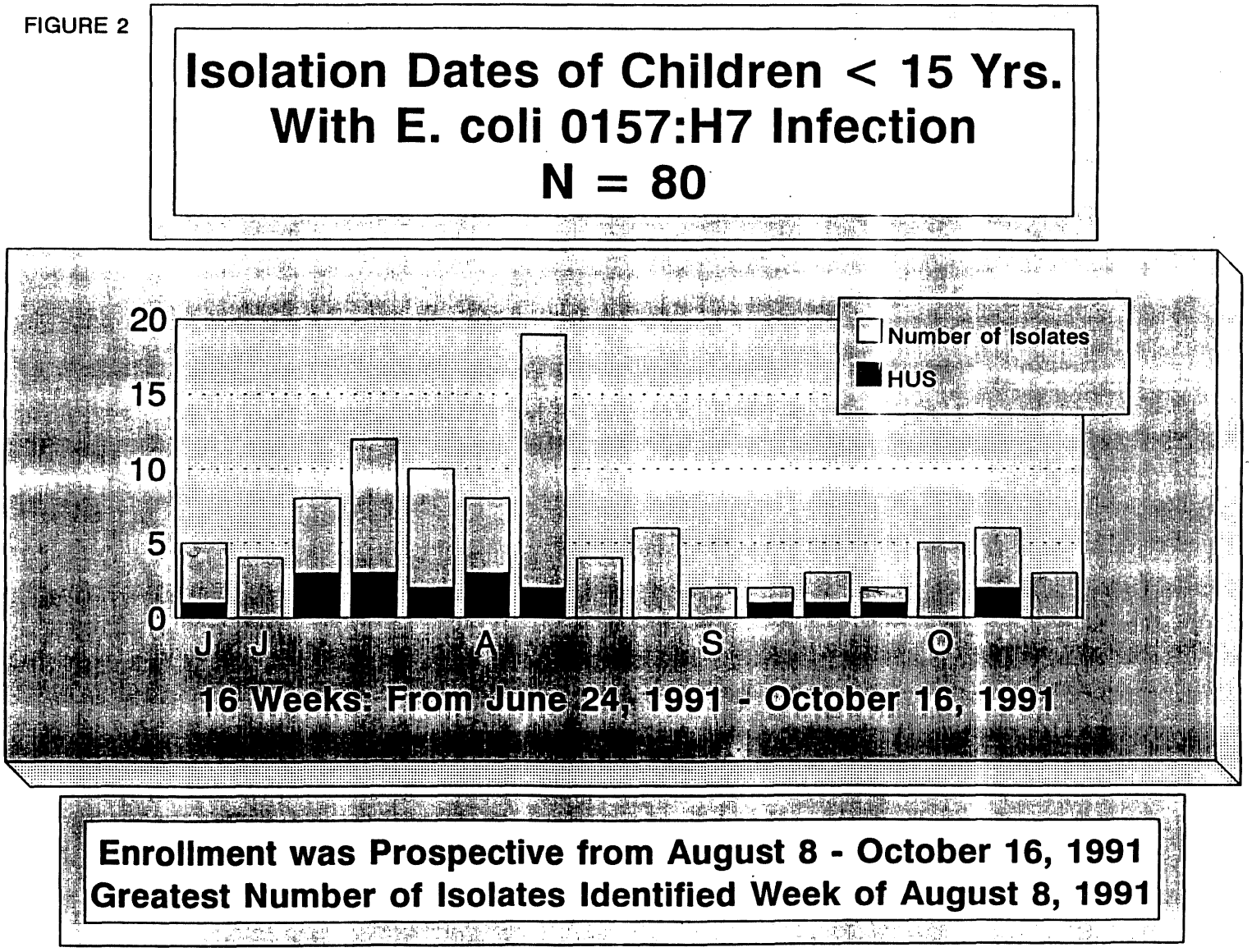
FIGURE 1

N = 80



Greatest Number of Isolates Identified Week of August 8, 1991

FIGURE 2


Isolation Dates of Children < 15 Yrs.
With E. coli 0157:H7 Infection
N = 80
20
15
10
5
0
Number of Isolates
HUS
J
J
A
S
O
16 Weeks: From June 24, 1991 - October 16, 1991
Enrollment was Prospective from August 8 - October 16, 1991
Greatest Number of Isolates Identified Week of August 8, 1991

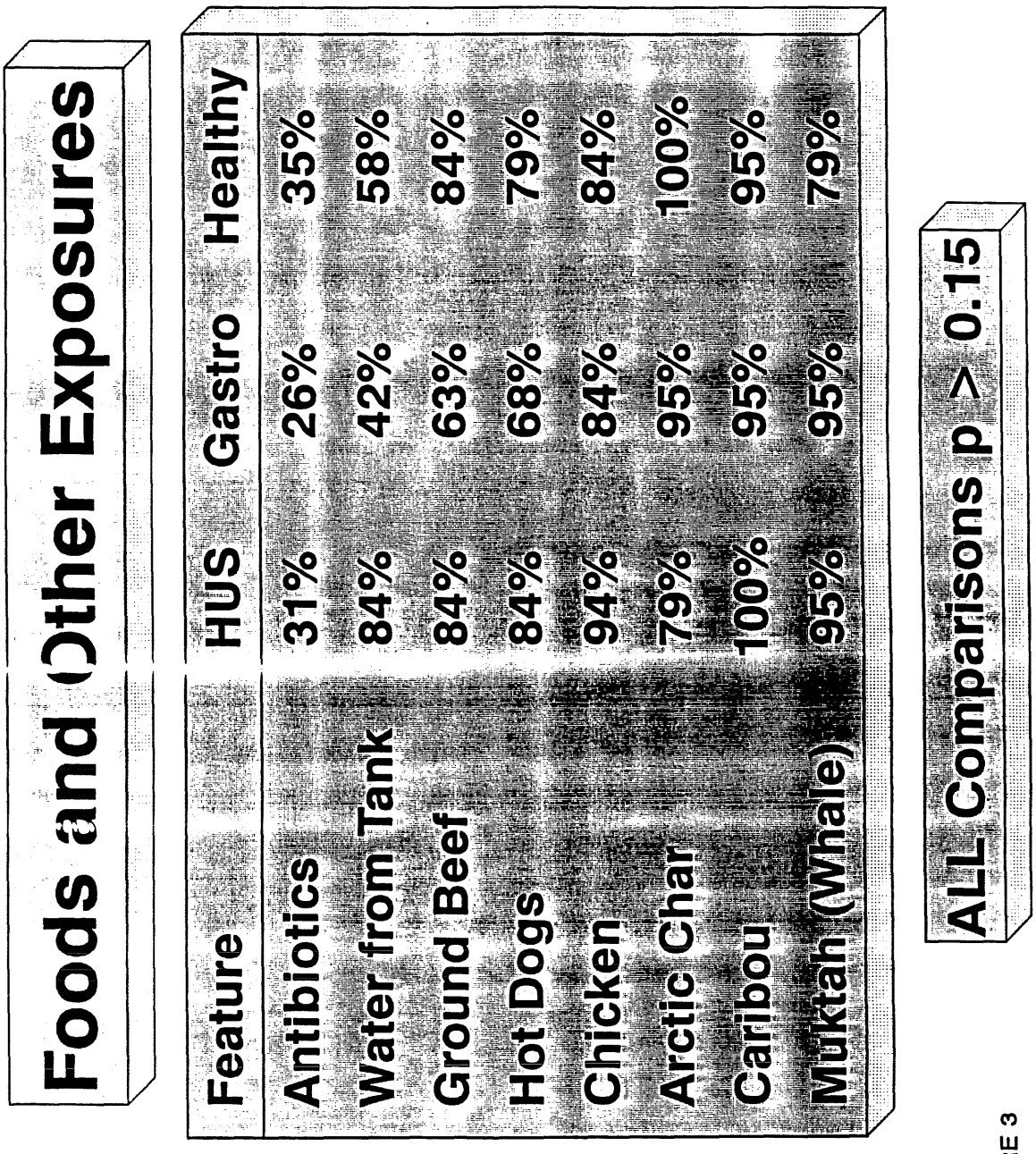

Foods and Other Exposures
Feature
HUS
Gastro
Healthy
Antibiotics 31% 26% 35%
Water from Tank 84% 42% 58%
Ground Beef 84% 63% 84%
Hot Dogs 84% 68% 79%
Chicken 94% 84% 84%
Arctic Char 79% 95% 100%
Caribou 100% 95% 95%
Muktah (Whale) 95% 95% 79%
ALL Comparisons p > 0.15

FIGURE 3

CHAPTER 8

HEALTH PROMOTION SECTION

GNWT DEPARTMENT OF HEALTH

REPORT

SUPPORTING HEALTH PROMOTION EFFORTS DURING THE E-COLI 0157.H7 OUTBREAK IN KEEWATIN REGION NWT

Prepared by: *Margie Crown*

Head, Policy & Planning

Health Promotion

Department of Health

June 28, 1992

CONTENTS

Page No.

INTRODUCTION AND ACKNOWLEDGEMENTS

During the period June through to October 1991 an outbreak of E. coli O157:H7 occurred in the Keewatin Region of the Northwest Territories.

The Health Promotion Section, Department of Health, Government of the Northwest Territories was asked to assist with public education and public health follow up and also to assist with community mobilization in non-infected communities. To provide this assistance, Health Promotion Section staff either put on hold or rescheduled projects and work so that staff efforts could be dedicated to assist with management of the outbreak.

The investigation and control of the epidemic was handled through the considerable efforts of a variety of people, including community health workers, health committee members, community members, local municipal council members, nurses, physicians, environmental health officers, health promotion officers and epidemiologists from various locations including the Keewatin Region, Yellowknife, Ottawa, Winnipeg and Churchill.

This report has been prepared for the Keewatin Regional Health Board to provide information on the Health Promotion Sections' participation in the outbreak.

The Health Promotion Section wishes to acknowledge and thank all the Keewatin Regional Health Board staff for the support provided while staff were travelling and working in the Region during the outbreak. In particular, a special acknowledgement is extended to Rosemary Brown and Rob Kielly for their efforts in coordination during the outbreak.

HEALTH PROMOTION SECTION SUPPORT TO E. COLI OUTBREAK MANAGEMENT

1. PUBLIC EDUCATION

In early August, 1991, the Health Promotion Section was contacted by the Keewatin Regional Health Board and asked to provide some assistance with public education for the E. coli outbreak. At that time, the outbreak was centred in Arviat, with a few cases in Baker Lake. It was reported that the local CHR in Arviat had developed some materials in cooperation with other Health professionals. The CHR was making posters and the Health Board indicated assistance was needed to support the CHR in his efforts to develop public education materials. The Arviat Health Centre staff and the Environmental Health Officer, Keewatin Regional Health Board, were contacted to determine what the needs were. The Environmental Health Officer expressed a need to have materials available for a door to door campaign in Arviat as well as copies of the public educational materials for dissemination to other communities in the Region.

Subsequent to the request the Health Promotion Section participated in the following way:

(l) Review, formatting, translation and printing of health education materials and handouts, produced by CHRs and Health Centre staff.

(2) Printing of a handwashing poster developed by the CHR in Arviat.

(3) Development of public education materials.

(4) Review and adapting of public education materials available from other jurisdictions. Arranging for translation into Inuktitut and printing.

(5) Providing advice and assistance with the development of radio spots and some ongoing support by telephone to the CHR in Arviat.

Educational Materials

In selection and development of educational materials emphasis was paid to ensuring that handouts and posters were appropriate for the target population.

The Health Promotion Section, through use of a MacIntosh Computer and the aboriginal language program MacTitut was fairly easily able to design and produce handouts for the campaign. The challenges became known when translations were required into the local language.

Translation of Educational Materials

The Language Bureau, Department of Culture and Communications is the official source of translation services for the GNWT. The Language Bureau sets the standards for translation in aboriginal languages in the NWT. They have staff at Headquarters and in the Regions. The Health Promotion Section, as standard procedure, contacts the Language Bureau in Yellowknife when a translation needs to be done. If accepted it is then the responsibility of the Language Bureau to send the translation request out to the Regions or the Bureau contracts a private source.

Source of Translation Services

If the Language Bureau is unable to handle a translation, then the Department arranges for a private contractor to handle the request. During the E. coli outbreak, the Health Promotion Section used whatever translation services were reliable and available at the time.

Usually, it is very difficult to get the Language Bureau to take on translation jobs that require a turn around time of a few hours to one or two days. Health Promotion, on receipt of a request from a Health Centre in the Region, tried to ship materials within one or two days. Sometimes the Headquarters Language Bureau staff were used for translation, other times Regional Staff and if no Government Services were available, a private contractor's services were used.

Due to the fact it was summer many Language Bureau staff were on holidays. However, the Language Bureau attempted where possible to accommodate our requests, often typing and vetting translations with a turn around time of several hours. Although the Health Promotion Section requested services of translators fluent in the Keewatin Dialect, those services weren't always available. In that instance, a translator fluent in another dialect did the translation and then checked by fax or telephone with a person in the Region, who was fluent in Keewatin dialect. During the outbreak, Health Promotion was always working with compressed deadlines due to the goal of getting information back to the community as soon as possible.

The Health Promotion Section received local community produced handout information prepared by CHRs. Sometimes the information, when vetted for accuracy, required corrections. It was an important point that the CHRs did their best but could not be expected to always accurately translate health messages into their written language as they are not professional translators. The accuracy varied with the CHRs' knowledge and ability to write the language. Another factor was that the CHRs who often were of the younger generation, were not familiar or aware of the words elders might use to describe certain situations/symptoms of illness. A factor, which is encountered in all Regions of the NWT is the dialectal differences that exist

within the Region itself. The materials sent to Baker Lake for example were adapted to ensure accuracy of the message in the community.

The community of Sanikiluaq also had a different dialect, (Northern Quebec) so all educational materials in Keewatin dialect had to be sent to the Sanikiluaq CHR who reviewed the material in collaboration with others and made the required changes. Although we asked the Language Bureau to vet the translations of the materials in Sanikiluaq dialect they couldn't as that expertise was not available in their Department.

Challenges with Translations

In one instance Headquarters Language Bureau staff vetted translation of handouts forwarded by staff in the Keewatin Region. When the handouts went out to the Region and were reviewed by people at the Regional Health Board, mistakes were found and the Regional Language Bureau Office, in a short time frame, made the necessary corrections. Many questions were raised. Although the Health Promotion Section attempted to put in place translation safeguards, it didn't always work out. The question was raised as to why, if the Headquarters Language Bureau, who set the standards across the NWT had vetted the translation, wouldn't all safeguards to ensure accuracy have been in place.

In reviewing this situation with Language Bureau Staff, Health Promotion was advised that the same text could be given to two different translators of the Keewatin Dialect and they probably wouldn't come out the same. The staff member said the bottom line is <u>are they accurate</u> not whether the wording is slightly different, as people express themselves differently.

The challenge of translation into aboriginal languages will be an ongoing one for Health

Promotion. Lessons were re-learned in the E. coli outbreak. The preferred source of translation is in the Region, unless it is known that local private contractors are fluent in the specific regional dialect. However, despite the challenges the Language Bureau staff are to be commended for their effort to help out and meet tight deadlines.

Public Education Materials Used

1. During the outbreak the following educational materials developed at community level were formatted, translated, printed and disseminated:

   Handwashing Procedure for Families - Handout

   Diaper Changing - Handout

   Rehydration - Handout

   Promotion of Handwashing - Poster by Arviat CHR

2. The following materials were designed in house, translated and printed by the Health Promotion Section:

   Protect Your Health - Fact Sheet

   Word Search Activity Puzzle - School Activity

   Handwashing/Good Hygiene Placemat - Colouring Activity

3. The following materials were adapted from materials already available:

   Steps to handwashing - Poster - adapted Canadian Institute of Child Health, Printed in English & Inuktitut

   Keep on Washing - Adapted Hibitane printed in English and Inuktitut

Germ Colouring Book - Translated into Inuktitut - Yukon contacts. Source unknown.

2. PUBLIC HEALTH CAMPAIGN IN BAKER LAKE

In the third week of August, as the number of E. coli cases seemed to be increasing in Baker Lake, the Keewatin Regional Health Board expressed concern regarding this increase and the need for a public health campaign as was done in Arviat. The Health Centre in Baker Lake was in need of additional help to assume responsibility for the Public Health aspect. The Head, Health Promotion offered to investigate the possibility of reassigning one of the Health Promotion Staff to Baker Lake to help. The Keewatin Regional Health Board was contacted and this possible strategy was discussed. The Board agreed. Approval was then sought and received from the Assistant Deputy Minister, Community Health and Standards. The Health Promotion staff person was then reassigned to the community of Baker Lake. The staff person chosen had strong public health skills and experience working in aboriginal communities. The Health Promotion staff person travelled to Baker Lake and remained in the community from August 26 through September 5, 1991. The Health Promotion Officer was assigned the following tasks:

(1) Public health follow up of E. coli cases as directed by Nurse in Charge.

(2) Facilitate an Open House related to E. coli O157:H7.

(3) Implement school wide teaching about E. coli O157:H7.

(4) Train volunteers for the community Door to Door campaign.

Open House

September 3, 1-4 P.M., Public Health Room, Health Centre

The Health Promotion Officer and CHR developed public service announcements and posters to advertise the event. These were distributed throughout the community. Input was also sought from "Super Shamu".

Four displays were set up each covered by a facilitator

- handwashing
- diaper changing
- information on E. coli & bacteria growth (slides, microscope, petri dishes)
- G.I. Tract model

There was also a handout table, videos were shown in the foyer and a refreshment room.

Approximately 250 people attended, mostly children.

Organizers felt that an evening open house in the future would reach the adult population.

Public Health Follow up

The Health Promotion Officer and CHR did three home visits to follow up on E. coli cases. The team ensured that the families were aware of safe hygiene practices, had adequate safe water supply and were aware of the symptoms of haemolytic uraemic syndrome.

3. COMMUNITY MOBILIZATION

At the end of August the E. coli infection had spread to several surrounding Keewatin communities. The Regional Health Board decided action was needed to mobilize community awareness in the non infected communities. Since the Regional Health Board didn't have dedicated resources to carry out this activity, they requested that Health Promotion take on this responsibility. In collaboration and consultation with the Regional Health Board a training workshop outline was developed by Health Promotion staff. Agreement was reached regarding the roles and responsibilities of the Health Promotion Section and the Regional Health Board in this endeavour.

Department of Health Role:

The Dept. of Health role was to provide the services of three Health Promotion Officers to travel to the designated communities in the Keewatin Region. The Health Promotion Officers were to take the lead role in delivery of a 1½ day training workshop on strategies to mobilize community resources in health promotion activities dealing with E. coli O157 issues. The training session would be delivered with the participation of the Environmental Health Officer and Community Health Nurse.

The Health Promotion Officers were to travel in overlapping schedules. These schedules were to be arranged to coincide with the timing of the Environmental Health Officer's visit to the community.

All costs associated with the Health Promotion Officer's visits would be assumed by the

Department of Health with the exclusion of Air Charters which might unexpectedly be necessary. In this case the Regional Health Board would make arrangements and bill back the Department of Health. Decisions on Air Charters would be made by the Regional Health Board and Department of Health.

Keewatin Regional Health Board Role

The Regional Health Board was responsible for coordinating the Health Centres' staff in terms of organizing the logistics of the training session as per their community. This would include:

- their review of and confirmation of participation of a Community Health Nurse and Environmental Health Officer in the training program,
- arranging for a suitable location for the training to take place (e.g. public health room), and a flipchart stand,
- to organize the participation of various community members and to confirm their attendance. It was recommended that the following community-based groups be asked to participate (there may of course be others to be considered):
    - Community Health Representative and/or others designated by the Health Centre staff to participate
    - Hamlet Council
    - Health Committee
    - Women's group
    - Community Education Committee

- School personnel/Local Education Authority
- Regional Health Board member
- Volunteers/paid help (under the direction/coordination and payment of the Regional Health Board)

- Organizing assistance in transporting the boxes of campaign materials that the Health Promotion Officers will be bringing to each community.

Delivery of Training Workshops

The purpose of the training session was to assist the workshop participants with the development of community based awareness and education strategies to:

- deliver health information on the issues of E. coli O157 infection and its potential consequences,
- plan measures that can be taken to prevent infection.

The training sessions were delivered in the communities of Coral Harbour, Whale Cove, Chesterfield Inlet and Repulse Bay. Although the Health Promotion Officer travelled to Rankin Inlet with the intent to deliver a workshop, it was decided by the Hamlet Council and the Keewatin Regional Health Board that other educational activities such as Health Fairs would be more appropriate at that time.

The training workshop was designed to promote as much participation from community participants as possible (Training Outline Appendix I). The facilitators used various ways of promoting participation, use of small and large group discussion, brainstorming, role plays, and building on the participants knowledge of the issue. Participants were asked what information

they would like from the workshop. The approach seemed to be quite acceptable. There were a lot of questions and concerns and time was needed to deal with those concerns.

The workshops were all delivered in English with the exception of Repulse Bay where an interpreter was available. The information was well received in all communities. In Coral Harbour and Chesterfield Inlet concern was expressed that the community should have received more notice of the workshop and that key people in the community be invited to participate. In Chesterfield Inlet the community was aware of the workshop only after the training team arrived, calls were made to invite people to the workshop the next day.

Community participants appreciated the opportunity to receive the information and express their concerns. In all communities, concern was expressed regarding whether E. coli O157 was in traditional foods, what would happen if it spread to their community and what was the source of the E. coli outbreak. Concern was expressed regarding the transport of food into their community and the presence of food whose best before expiry date was long passed. The participants also expressed concerns over their community's water supply and sewage disposal. The question of water availability to allow for safe hygiene practices and cleanliness in homes was raised. In some communities there was concern regarding how safe it was to travel to other communities in the Region.

In most communities, participants defined issues of concern and action they felt should be taken. A more detailed account of the workshop outcomes is contained in Appendix II. All participants reported that the workshop was a worthwhile experience but indicated more notice and promotion of any workshop of this nature should occur in the future.

COST OF HEALTH PROMOTION SECTION SUPPORT

An estimate of costs incurred during the E. coli outbreak is provided. Costs incurred represent the cost of the design, translation, printing and shipping of public health education materials and staff overtime, travel and accommodation costs. This estimate does not include the telephone, fax or other miscellaneous administrative costs.

Estimate of Costs

• Public Education Materials	$ 3,150.00
Staff Travel	8,227.32
Staff Overtime	6,020.00
Total Costs	$17,397.32

- Includes design, formatting, translation, printing and shipping.

APPENDIX 1: TRAINING OUTLINE

DEVELOPING COMMUNITY STRATEGIES/

COMMUNITY AWARENESS CAMPAIGN

TO DEAL WITH "E. COLI O157" INFECTION

AGENDA

SECTION I

Introductions

1. **Introduction of session facilitator** (Health Promotion Officer, Environmental Health Officer, Community Health Nurse.)
2. **Goal of this Session.**
3. **Introduction of session participants: CHR/canvassers, School personnel, Hamlet Council representatives, Regional Health Board members, others.**

Methodology:

Facilitators will introduce themselves and present the goal of this session. Participants will be asked where they are from, their background, what role they have in the community, how they feel about their involvement in this session and any concerns they may have. Facilitators will record these comments on flipchart paper and post them to available wall space. The comments will serve as a reference point and guide for the facilitators throughout the session.

Content

1. Goal of this Session (Health Promotion Officer)

The goal of this session is to assist participants in the development of community-based awareness and education strategies to:

- deliver health information on the issues of E. coli O157 infection and its potential consequences,
- measures that can be taken to prevent infection.

SECTION II

Review of Agenda

1. **Presentation of the Agenda** (Health Promotion Officer)

- **discussion/feedback**

2. **Techniques to be used in Session** (Health Promotion Officer)

Methodology:

Facilitators will review the agenda. Photocopies of the agenda to be handed out. Presentation of agenda on flipchart. Participants will be asked whether the agenda is suitable to them, if there are any items they would like to include, if there are any individual conflicts with the time schedule, etc. Any adjustments that can be made would be made at this time. Facilitators will explain the use of small and large group discussion in the training as well as role play. Clarification if required.

SECTION III

Overview of the Issues

1. **Participants' Knowledge of the Issues**

2. **History of the E. coli O157, HUS in Keewatin**

Participants' Knowledge of the Issues

(Health Promotion Officer)

Identification of participants knowledge level around E. coli O157 and HUS issues in the Keewatin region. What do they know about the E. coli O157 bacteria? What have they heard about what has been happening? What would they like to know?

Methodology:

Group discussion led by facilitators. Record participants' comments on flipchart to serve as a reference throughout the session. (This method brings the participants' interest level into the session - makes the information sharing much more meaningful by dealing with where the participants are at in their understanding).

Content

History of E. coli O:157, H.U.S. in the Keewatin Region

(Environmental Health Officer/Nurse)

- Simple and concise explanation of what E. coli O157 is.
- How E. coli O157 affects the body.

  - incubation
  - how is it spread

- symptoms of infection
- illnesses
- treatment
- preventive measures
- high risk groups

- Common names E. coli O157 infection is known by.
- Incidence of infection in other parts of Canada.
- How the infection began in the Keewatin starting in Arviat.
- Action taken by Keewatin Health Centres & the Regional Health Board.
- Involvement of the GNWT Department of Health, Federal Centre for Disease Control, Others.
- Community approaches taken to deal with the issues. Emphasis on the team approach between the Health Centres, Health Committees, Hamlet Councils, Community Education Committees, School personnel, others.

Methodology

Facilitators present information on the above points with reference to participants comments in part #1. Question/answer/group discussion format. The basic information on the points will be preserved by using flipchart supplemented by handouts in point form.

SECTION IV

Developing Community Strategies for a Community Awareness/Education Campaign

1. Participants will discuss and identify facilitating factors and barriers to educating the community on the issues of hygiene and food handling in the intervention and prevention of E. coli O157 infection. (Health Promotion Officer/Nurse)
2. Participants will identify strategies and develop plans of action to develop a community-based campaign. (Health Promotion Officer)

Methodology

1. Facilitators will stimulate discussion on the facilitating factors and barriers by asking participants to compare and contrast the different environments Inuit people traditionally lived in as compared to the present day. Record comments on flipchart.
2. Through group discussion participants will brainstorm ideas and plans of action to develop a campaign appropriate for their particular community. Record on flipchart.

Content:

1. **Cultural attitudes towards hygiene and food handling practices**

   Practices in the Past - Life in the Igloo

   - cleaning the igloo
   - use of water
   - use of moss for diapers

- temperature of igloo and food handling

Practices Today - Life in a Permanent Dwelling

- availability of water, sewage facility
- household cleaning practices
- care of children - use of disposable diapers - availability and cost - food handling practices in a warm environment

Other infectious diseases related to water, sewage, food handling and hygiene factors

- Hepatitis A
- Tuberculosis
- Others

2. **Community Strategies/Plans of Action**

Facilitators Questions:

1. Who needs to be informed about this infection:
   - children (age - categories)
   - parents
   - elders
   - groups/agencies

2a. What needs to be done now in the community?
   - what was done in other communities?
   - what worked and didn't work?
   - what is being done currently in the community (e.g. by health staff, others)

2b. Potential Strategies

- door to door campaign.
- local radio phone in programs, community announcements.
- presentation/information sessions to Hamlet Councils, groups, committees such as parents group, Hunters & Trappers, Alcohol & Drug Committee, Seniors Group, Ladies Group, Church Group, etc.
- community meetings.
- open house at Health Centre.
- special visits/presentations to daycares or homes where many children are being looked after.
- exhibition of health posters related to the campaign in public places throughout the community.

3. List strategies that they see as necessary/appropriate for their community.

- prioritize strategies

4. Action Plan for Strategies

- Who is going to do it?
- How is it going to be done?
- Where will it take place?
- What resources are needed to carry it out?
- When will it take place?

SECTION V

Role of the Participants in Developing and Implementing the Campaign

1. Participants will discuss the roles they each can play in implementing the strategies of the campaign and examine ways they can work together as a team in supporting one another. (Health Promotion Officer)
2. Participants will identify and review resources needed to implement the campaign strategies. (Health Promotion Officer)

Methodology

Facilitators will lead group discussion on these points. Record discussion on flipchart. Facilitators will lead participants through practice role plays in implementing the various strategies they have developed such as the door to door group presentation strategies. Through group discussion participants will share comments on the results of the role play.

Content

1. Possible roles of:
   - CHR
   - Door to door canvassers
   - Regional Health Board member
   - Hamlet Council representative
   - Community Education Council
   - School personnel

- Others
- Community Health Nurse
- Environmental Health Officer

2. Resources (Presentation/Review of Materials Already Developed)

- Local
- Regional
- Territorial
- Door to door materials
- School materials
- Community posters

SECTION VI

Evaluation/Follow-up of the Effectiveness of the Community Strategies

Participants will identify evaluation strategies/follow-up to the campaign to measure effectiveness and create reinforcement of the messages. (Health Promotion Officer, Environmental Health Officer, Nurse)

Methodology

Brainstorming

Content

Follow-up to door to door campaign such as going back to homes to reinforce message and determine if people are implementing changes through discussion. Follow-up to radio

strategies. Reduction of infection in the community.

SECTION VII

Evaluation of Session (Health Promotion Officer)

SECTION IV

COMMUNITY MEETINGS

CHAPTER 9

COMMUNITY MEETINGS/WORKSHOPS

(DURING THE EPIDEMIC)

Extracted From: **Health Promotion Section**

GNWT Dept. of Health Report

COMMUNITY REPORTS

CORAL HARBOUR

Workshop Facilitators - Berre Patenaude, Health Promotion Officer

- Peter Parys, Environmental Health Officer

Date September 12, 1991

Number of Participants - 6 in the morning session

- 12 in the afternoon session

Community Concerns

A number of concerns were raised by the participants, some of which are listed below.

1) What can we do about the poor quality of food arriving in the community?

2) We have no control over the flights (Calm Air) and our food can be bumped at anytime.

3) We don't know how many times the food has thawed when we receive it.

4) We have stock in our Northern and Co-op Stores with dates: Best before stamped 1984.

5) How safe is our water?

6) Is the water chlorinated? Who is responsible for testing?

7) How can we make sure the men working on the waste pick-up trucks don't go into the Northern and Co-op Stores with their work clothes on and handle the food?

8) How often are these trucks checked for leaks?

9) When the schools waste holding tank gets full where does the over flow go?

10) Is there a special place to dump human waste separate from regular garbage?

11) How long does it take for symptoms of E. coli to show up?

12) Should we keep visitors from our community?

13) Should we visit a sick person?

14) Can we get E. coli from country food?

15) Concern was expressed by participants regarding the small number of participants and that more people should have been informed about the workshop. Participants decided to contact other people over lunch hour. As a result, more people attended in the afternoon.

Community Action Plan

The participants listed three areas where they wished to seek some action.

1. Write a letter to Calm Air explaining their concern about shipping of food into Coral Harbour.
2. An information workshop for people who work with waste disposal and water delivery in the community.
3. Door to Door campaign on E. coli.

For the afternoon session they decided to work on

1. Door to Door campaign
2. Workshop for workers in waste disposal and water delivery.

The concern regarding shipping of food was handled through two participants who

agreed on a date to meet and prepare a letter to be sent to Calm Air.

During the remaining time in the afternoon participants developed an action plan and dates for a door to door campaign to be lead by Silu Connelley, the CHR in the community. They also set dates for the information workshop for workers in waste disposal and water delivery.

The participants in their discussion expressed that the workshop had been a useful process.

Meeting With The Nurse In Charge

The N.I.C. in the community suggested that the handwashing handout have "dry your hands thoroughly" added to it. This change was being made to all handouts given out in their community.

WHALE COVE

Workshop Facilitators: - Berre Patenaude, Health Promotion Officer

- Peter Parys, Environmental Health Officer

Date September 19, 1991

Number of Participants - 6

The training team found that a lot of public education and awareness activities had already occurred in Whale Cove. The CHR had been very active. The Health Centre had excellent displays designed by the CHR. The low number of participants was probably because of all the work previously done in the community.

Community Concerns

The concerns/questions were similar to those raised at the Coral Harbour workshop. Many had already been addressed through activities which had occurred in the community.

Action Plan

The small group present decided to:

1. Conduct an evaluation on the Door to Door campaign.
2. Hold an open house for the school children at the Health Centre where they would have a slide of the bacteria E. coli and a movie for them to view.
3. Hold an open house for the elders at the Health Centre (one of the elders in our workshop agreed to give Linda (CHR) a hand with this).
4. Linda (CHR) & Peter would go on the radio this evening. This time the 12 to 16 years

olds (Linda had done a couple of radio spots on E. coli already) would be the target group.

After the workshop the training team and the CHR met separately with the local school principal to discuss strategies for dealing with the E. coli issue in the school. Time was also spent with the CHR helping her prepare for the radio show that evening.

CHESTERFIELD INLET

Although the Health Centre Staff were aware of the workshop, when the Environmental Health Officer and Health Promotion Officer arrived, it was found that no preparation had taken place for the workshop that evening and that the community had not been informed. Subsequently, activity focused on contacting community people and letting them know about the workshop. It was scheduled for 10:00 a.m. the next day.

Workshop Facilitators - Julie Sanguins

Number of participants - 8

Community Concerns

Questions raised included:

1) If hamburger is received unfrozen do we need to be cautious about using it?

2) What can we do about the water truck getting stuck in the winter?

3) What type of cans are good to get water in?

4) Is water chlorinated? Why?

5) Why no vaccine for E. coli?

6) Can you catch it over again?

7) Cleanliness of the uniforms of the garbage/sewage workers?

8) The participants raised the fact that water availability and the reservoir are critical elements in hygiene practices of the people of the community.

9) Participants also felt that most community members were aware of the E. coli O157 but

perhaps didn't understand the significance of the disease to them.

10) The participants discussed the various approaches used by other communities in the Keewatin.

Community Action

1) The School principal expressed the importance of the Health Centre Staff's ongoing presence in the school. He suggested monthly visits to the school by Health Centre staff.

2) The participants suggested they would approach the CHR to make some PSA's for the radio.

3) The participants expressed concern repeatedly regarding completion of the reservoir near town. One participant agreed to bring this concern to the Regional Health Board.

4) The Health Promotion Officer visited the school the next day and gave a short presentation on E. coli and a handwashing demonstration. Six classes were involved.

5) Participants identified the Keewatin Regional Health Board's Environmental Health Officer as a resource to call upon in the future.

6) **Participants expressed the need for more notice to the community regarding workshops like this which might occur in the future.**

REPULSE BAY

Workshop Facilitators - Margie Crown, Health Promotion Officer

- Bruce Stephen, Environmental Health Officer

Date September 26, 1991

Number of Participants - 19

Upon arrival in Repulse Bay the Health Promotion Officer was informed by the Nurse In Charge at the Health Centre that the local Health Committee wished to meet with the facilitators and to have the workshop purpose and agenda presented to them. The meeting was already scheduled for 8:00 p.m. that evening.

The Health Promotion and Environmental Health Officer agreed to meet the Nurse In Charge after supper and to proceed directly to the Health Committee meeting.

At 8:00 p.m. the Health Committee meeting convened. The workshop facilitators were introduced to the Committee by the Nurse In Charge. The Health Promotion Officer was invited to review the purpose and agenda of the proposed workshop. Through an interpreter, this information was conveyed to the group present. Approximately thirty people were present at this meeting including the Hamlet Mayor and Councillors.

Following the presentation the Health Committee recommended the workshop begin the next day at 1:30 p.m. The Mayor and Hamlet Council members volunteered to cancel their meeting scheduled for the next evening, to free up the Council Chambers for the workshop.

The workshop was opened at 1:30 p.m. by the Health Committee Chairperson. An

interpreter was present to ensure the information was conveyed in Inuktitut.

Community Concerns

There was a very high level of interest in the community. Many questions were raised and concerns expressed by participants at the workshop. Questions raised included:

1. Can it be contacted from land or sea animals?
2. What about dried meat? Are there germs in it? Frozen meat?
3. Is it from the water?
4. Can I get it from caribou?
5. I don't eat hamburger. Can I still get sick?
6. Can it be spread by cup?
7. Can you breathe in the germ?
8. Can you get sick by working with an ill person?
9. Will freezing kill E. coli?
10. Can you have the illness but not know it?
11. Can I get sick from touching someone who is sick?
12. How do you tell this diarrhoea from other diarrhoea?
13. Incubation period length?
14. Can you carry the germ on your clothing?
15. How does it make you sick?
16. What is the culprit?
17. Is the organism in stool?

18. What is the treatment?

19. How do you avoid it?

20. Can it be transmitted on towels? Particularly wet towels?

21. Is it necessary to wash dishes with javexed water?

22. When the outbreak began in Arviat, was the cause found?

23. Should we be concerned about eating raw traditional food?

24. What about outdated foods in the store, expiry dates on foods in community (one case of expiry day 1982).

25. What do parents do if they notice a child has some symptoms?

26. How long does it take to get a result if samples are sent out?

27. Would bacteria multiply if hand lotion is applied?

28. Cleanliness in relation to the disease. Concern regarding whether some houses in the community were clean enough.

29. Concern regarding spread of the disease in relation to the school. What would signify need to close the school?

30. What is HUS? How do you know you are developing it?

31. There was a lot of confusion and concern whether people could safely travel to Arviat or Rankin Inlet for workshops or for other reasons.

Community Action

The group didn't formally break into groups to discuss an action plan. They wished to make suggestions and the Health Committee could follow up.

1. Food in stores past expiry date

   - let media, Keewatin Regional Health Board, Minister of Health know about this
   - let store manager know
   - community can put pressure on by writing a letter about this issue
   - Environmental Health Officer to let Keewatin Regional Health Board know
   - Community Health Committee can write a letter advising of these concerns to local store, head office and related offices.

2. Recommendation to stress the importance of cleanliness in the home.

   - involvement of Health Committee, Keewatin Regional Health Board or Housing Association
   - Health Committee might conduct home visits to promote awareness

3. There is need for a community health inspector in Repulse Bay to promote a broad sense of the individuals involvement to develop a healthy community.

4. Get information out on radio about E. coli.

The Health Committee was to do the follow up in the community. The public education handouts and posters were given to the Health Committee Chairperson.

The session recessed at 5:30 p.m. and resumed at 8:00 p.m.

Since there had been a lot of questions on Haemolytic Uraemic Syndrome it was suggested that Dr. Mike Moffatt, the visiting paediatrician, be invited in the evening to answer those questions. The focus of the evening session was on questions and concerns regarding E. coli but also in regard to the measles outbreak.

The following day the Health Promotion Officer met with the teacher from the school at her request. The school education strategies and materials were reviewed and copies were given to the teacher. Time was also spent at the Health Centre.

RANKIN INLET

Although the initial strategy was to deliver a workshop in Rankin Inlet, after discussion with officials of the Keewatin Regional Health Board it was decided the timing wasn't right for a workshop. The community was very focused on the measles outbreak and a number of awareness activities had already occurred.

Instead of a workshop the Health Centre Staff recommended that a health fair in the school was needed as well as some displays and awareness activities. Activities were organized as follows:

a) On September 21st the Health Promotion Officer with a local community Health Nurse, set up a display at the Northern Store.

b) On September 22nd a Health Fair at the Health Centre was held in the afternoon.

c) On Monday, September 23rd a Health Fair was held in the Resource Room of the Elementary School. The Public Health Nurse, Community Health Representative, Clerk Interpreter, Environmental Health Officer and Health Promotion Consultant staffed the various displays. Handwashing, diaper changing, effects of E. coli O157 on the body, mode of transmission and visual information on the bacteria were the basis of the health fair booths. Visitors were invited to look, ask questions and were given handouts to take home.

All of the elementary classes and several high school classes attended and asked many questions.

CHAPTER 10

COMMUNITY REVIEW

AND

TECHNICAL REVIEW

(FOLLOWING THE EPIDEMIC)

Prepared by: ***Robert Kielly*** **CPHI(C), KRHB;**

B. Lorencz **RN BNSc,** ***W. Murphy*** **RN BN,** ***O. Anoee*** **CHR,**

Arviat Health Centre;

Interagency Committee, Arviat.

During a meeting with the Minister of Health, the Honourable Nellie Cournoyea, in Rankin Inlet in early August, 1991, the KRHB requested that a review of the entire disease investigation and containment process be conducted following the culmination of the outbreak. The Minister agreed with this request and indicated that the necessary funding would be made available. It was felt that the review process would provide a forum for community residents to ask any questions, express any concerns and offer suggestions for the future handling of communicable disease investigations. It was also felt that this type of exercise would give the large numbers of technical personnel a chance to discuss the events which transpired during the course of the outbreak, address the issues arising from the community review and make recommendations for changes in disease investigation and control policies and practices.

The review was initially planned for January, 1992 in Arviat. The plans had to be put on hold because of a Government of the Northwest Territories restraint program which cancelled all but essential travel. This restraint program limited the availability of several key people so the decision was made to postpone the review until a later date. The review was finally organized for May 5 to May 8, 1992. The community review took place on May 5 and May 6 in Arviat and a technical review followed on May 7 and May 8 in Rankin Inlet. Arviat was chosen as the site for the community review because it was, by far, the most severely affected community during this outbreak.

People present at the **community portion** of the review were:

Co-Chairs:

Elizebeth Palfrey, Chairperson, KRHB and

Mary Pameolik, Chairperson, Arviat Health Committee

Others Present:

Members	Arviat Health Committee
Nuri Sinuff	NIC, Arviat Health Centre
Community Health Nurses	Arviat Health Centre
Obed Anoee	Community Health Representative (CHR) Arviat Health Centre
Dr. Donna Holton	Laboratory Centre for Disease Control
Rosemary Brown	Regional Nursing Officer (KRHB)
Robert Kielly	Sr. Environmental Health Officer (KRHB)
Dr.Pam Orr	Consultant, J.A. Hildes Northern Medical Unit and Cadham Laboratory Manitoba
Dr.S.Macdonald	Director, J.A. Hildes Northern Medical Unit and Medical Advisor, KRHB
Dr.R.Nuttall	Acting Chief Medical Health Officer, GNWT Dept. of Health
Jack MacKinnon	Head Environmental Health, GNWT Dept. of Health
Leslie Knight	Assistant Head, Infectious Disease Control, GNWT Dept. of Health
Dr.C.Pim	Territorial Epidemiologist at time of the outbreak

Members of community	Approximate total 42

Apologies

Paul Pemik	Mayor, Hamlet of Arviat
Elaine Orrbine	Canadian Paediatric Kidney Disease Reference Centre

People present at the **technical portion** of the review were:

Co-Chairs:

Elizebeth Palfrey, Chairperson, KRHB

Robert Kielly, Sr. EHO, KRHB

Others Present:

Rosemary Brown	Regional Nursing Officer, KRHB
Dr.P.Orr	Consultant, J.A. Hildes Northern Medical Unit and Cadham Lab Manitoba
Margie Crown	Health Promotion, GNWT Dept. of Health
Dr.D. Holton	Laboratory Centre for Disease Control
Jack MacKinnon	Head, Environmental Health, GNWT Dept. of Health
Dr.C.Araneda	General Practitioner, Churchill and Rankin Inlet
Dr.S.Macdonald	Director, J.A. Hildes Northern Medical Unit and Medical Advisor, KRHB
Dr.R.Nuttall	Acting Chief Medical Health Officer, GNWT Dept. of Health
Leslie Knight	Assistant Head, Infectious Disease Control, GNWT Dept. of Health

Dr.C.Pim Past Territorial Epidemiologist, GNWT Dept. of Health

Both the community and technical portions of the review proved to be very valuable to all who were involved. Many positive comments were received from the community and from the technical participants about the value of having this type of review conducted. As a result of the community and technical portions of the review, a total of 20 recommendations were generated. These recommendations are outlined and discussed in Chapter Two.

The following presentations are included next in this chapter:

- Interagency Committee Presentation
- Arviat Health Centre Presentation
- Community Health Representative Presentation
- Letter from Child's Mother (Child died from complications with HUS)
- Health Committee Presentation (Reconstructed from minutes of the meeting)
- Hamlet Council Presentation (Reconstructed from minutes of the meeting)

Interagency Committee Presentation

Thank you for the opportunity to address the panel on behalf of the Arviat Interagency Committee.

First, an explanation of what the Interagency Committee is.

The Committee was formed in 1989. The Health Centre, Social Services, school, Arctic College and the churches have been involved since the start. It was intended to bring together community groups and agencies to deal with community social issues. A few of the issues we've dealt with have been AIDS awareness, solvent abuse prevention, suicide prevention, and, most recently, occult awareness.

Until the E. coli epidemic last year, we met once a month. We stayed loosely organized so that community groups could join into activities when their expertise was required or their interests involved.

We met more regularly during the E. coli epidemic. We began to invite people from volunteer committees, businesses and other organizations to come to these meetings. Since the epidemic, we've decided our role will continue to be to bring together a network of people in the community to take community based action on social issues. We will also give support to groups so that they don't feel like they are working alone. We decided to remain loosely organized. Although we'll have an elected main contact and spokesperson, everyone will take turns chairing meetings and doing the minutes.

At the last Interagency meeting, we put together our ideas for this presentation.

First, we would like to say that the Health Centre staff did an excellent job of treating people who became sick with E. coli O157. We realize that they could not have done this without the support of the Keewatin Health Board. The nurses worked long, hard hours and we know that it must have been hard for them to see the children, in particular, suffer. We also recognize the extra time and money that the Health Board committed to take care of sick people. The Health Board also got the support of medical experts around the country and even some in the United States.

In hindsight, we do feel that more of the right things should have been done to keep people from becoming ill in the first place. There needs to be a much stronger emphasis on public health intervention and prevention. The experts were involved with investigations, the KRHB was reacting with as much support as their limited resources would allow, the nurses were swamped with sick people, the community was attempting to respond as best it could with volunteers and limited information. Who was in charge? Who was legally responsible for the over all handling of this epidemic?

When Dr. Pamella Orr came to Arviat, we saw the start of the kind of community based talking and action we would have liked to have seen from the beginning. Dr. Orr was a good choice because she is well known and liked by people in Arviat. Also, she was able to bring together medical knowledge and community development skills in just the right way.

Unfortunately, Dr. Orr was brought in late in the epidemic. Since there had been so little information and so many conflicting messages given to the public, there was already fear, mistrust and confusion in the community. Dr. Orr didn't stay long enough. Good things started

while she was here and probably would have continued if she, or someone like her, were here to continue what she started.

Dr. Orr, or someone like Dr. Orr, should have been in the community from late June and stayed throughout the epidemic to give expert information and to facilitate community based action.

Bringing in Helen Klugston R.N. to do full time public health was also a big help. We saw her work very hard and she cared very much. However, sending her back to Repulse Bay before the end of the epidemic sent the message that the epidemic was over. It also appeared that there was no follow up planned for the important work she began.

Has there been a systematic follow up with the families Helen was working with?

The community radio blitz at the height of the epidemic resulted in lots of people becoming involved in battling the epidemic. Broadcasts were in both languages. There was a feeling that we, as a community, could do something together to help ourselves. The information on the radio was good. Finally, there weren't so many mixed messages coming from different organizations. The community showed a willingness to pull together.

The Hamlet Council and the Community Education Council had hard decisions to make. We realize that these decisions were made even harder with the little and conflicting information that was provided. We can appreciate the position that they were all in and thank them for doing their best.

The Hamlet Council is ultimately responsible for all aspects of community life in Arviat. We see the need for the Hamlet Council to take ownership of community problems. They

should use resources and experts to help them make decisions, but it is they who must make these decisions. Other community agencies must follow their lead.

We saw mixed messages and information coming from different sources in the community: from the Health Board, from the Health Centre, from the "experts" brought into Arviat. Sometimes opposite messages were given. Just one example is, on the radio people were told that the sickness was serious but not to worry because it is very difficult to get it. However, we were having an epidemic so that message severely undermined the credibility of the message givers. We were also told that the disease was spread in poor and over crowded housing, leaving the impression that people in good homes didn't carry or pass the disease. People became confused.

We think that sharing information about the epidemic from the beginning should have been imperative. It should have been shared through one agency - the Hamlet Council. By using the Hamlet Council, sharing information and activities could have been coordinated by those who know the community best. Discussions about how the information was to be presented needed to happen. Instead of holding back information for fear of creating a panic, the Health Board should have been more open.

The information should have been given to the public, not just to a few people or the Health Centre. To decide for adults what they should and should not hear is to treat them like children. Also, the Health Board needed to set up dialogues with the community to talk to people rather than at them.

The information that is given should be clearly stated and leave as little room as possible

for misunderstanding. Use plain English and Inuktitut on signs and other written information. Be careful that messages do not carry "misinformation" by what they don't say.

Later in the epidemic the Health Board staff asked the Hamlet Council to make certain decisions and said they would support Hamlet Council actions to end the epidemic. But when the Hamlet Council announced it's decisions (for example, the cancelling of the Music Festival), Health Board staff were heard the next day on the regional radio saying that the Arviat Hamlet Council's decision was not one they recommended. The Health Board seemed to pull the rug out from under the Hamlet Council's feet and made them lose credibility in the community. These actions helped to further divide the community instead of bringing us together.

The Regional Health Board staff should, at least publicly, respect the local government's authority to decide on community matters.

As people who live here, we feel that the resources of the community weren't properly recognized or used. The door to door campaign was helpful and a step in the right direction, but it was the Health Committee who knew the trained workers best and whose idea the campaign was in the first place. They should have been involved in its implementation.

Each community has its own strengths. People who have already taken on leadership in the community need to be used. By having the Hamlet Council coordinate a community response, community resources would have been better used.

Finally, to prevent another epidemic from happening, we suggest:

- that the Public Health Act be enforced. There should be working washrooms at all worksites, including temporary worksites. There should be operational facilities with

soap and running water at all public gatherings and especially were food is being served. This includes the community halls and churches. Water and sewage systems should be investigated, including the handling of honey bags and the sewage disposal equipment.

- that the Health Board work with community groups, primarily Hamlet Councils, so that every community knows what the law says must be done. The Health Board should prepare a short, easy to read version of these regulations to circulate in communities. The hamlet councils should ensure that all community groups comply with these regulations.
- that the Health Board keep up public health education using lessons learned from last year's epidemic. Use a community network of people so that the message gets spread by lots of different people in lots of different ways. Use new ideas - songs, poster or writing contests, community theatre, informational displays. ASK THE COMMUNITY FOR IDEAS AND SHARE THEM!
- that plain language be used on posters in public places. Literacy workers suggest that posters should be written at a grade 6 level. Local literacy groups could be asked to design informational materials.
- that the Health Board develop clear guidelines to be followed in the case of an epidemic and that these guidelines be shared with Hamlet Councils. The Board may work with communities in developing guidelines, remembering that individuals have a right to know about issues affecting their health.

- that the Chief Medical Officer of the NWT appoint a Medical Officer of Health or designate to coordinate, with the Hamlet Council, community based responses in an epidemic. Dr. Gilchrist did appoint Dr. Caroline Pim to act as Medical Officer of Health, but she was only in the community for 1½ days. Given the extent and length of this epidemic, this involvement was insufficient.

Health Centre Presentation

E. coli O157:H7 Review: Arviat Health Centre Report

Prepared by: B. Lorencz RN BNSc MNSc and W. Murphy RN BN

From June 8, 1991 until November 26, 1991, over 500 cases of diarrhoea were seen at the Arviat Health Centre. This number includes repeat episodes of diarrhoea but does not reflect the actual number of visits to the Health Centre. The number of actual visits to the Health Centre was substantially greater because of the number of follow up visits required by each client. Children and elderly were followed closely due to their higher risk of developing complications. Those children who had very acute presentations were assessed three times per day during the most acute phase of their illness.

The assessment done at the Health Centre on all diarrhoeal presentations included:

Clinical Assessment

1. **History**

   - onset
   - frequency, consistency, and colour of stools
   - cramping
   - vomiting
   - pain
   - voiding and oral intake
   - fever

- diet recall (food history)

- contact with suspected cases

- activity level

- irritability

2. Physical Examination

- general physical examination including ears, throat, chest and abdomen

- weight

- hydration status: mucous membranes, skin turgor, fontanelle, sunken eyes, tears, voiding, change in mental status, heart rate

Assessment of potential indicators of the development of HUS:

- blood pressure

- anaemia: conjunctiva and haemoglobin (finger poke)

- bruising and/or petechiae

- edema: periorbital, dependent

- voiding (considering state of hydration)

- mental status: irritability, lethargy

3. Laboratory Test

- blood smear for haemolysis of red blood cells

- urine: concentration (specific gravity)

blood

protein

ketones

- venipuncture: electrolytes, CBC and renal function

(CHC laboratory staff would phone the results the next day if requested or if the results were abnormal)

- stool sample: sent to Cadham laboratory in Winnipeg

4. Diagnosis

Diarrhoea NYD until confirmation by laboratory results (stool sample)

Nursing Actions

1. Maintenance of Fluid and Electrolyte Balance

- oral clear fluids as tolerated until diarrhoea resolved
- gastrolyte electrolyte replacement

2. Pain Control

- Tylenol as per weight every four to six hours as necessary

3. Diarrhoea

- collection of stool sample for culture and sensitivity
- observation and documentation of number, colour and consistency of bowel movements
- close observation of the condition of the individual including repeat physical assessments as outlined above

4. Teaching

- teaching caregivers of those with diarrhoea focused on two main topics:

a) Care of an individual with diarrhoea

- oral rehydration
- monitoring diarrhoea/vomiting
- pain control for abdominal cramps
- rest

b) Reducing the risk of spreading the illness

- handwashing after caring for the ill child/adult
- maintaining good hygiene, for example, keeping the child in diapers at all times
- disposing of contaminated diapers
- cleaning the bathroom
- public health teaching about safe hygienic practices in the home

Medevacs

The majority of children effected were nursed in their home with the support of the Health Centre. During the outbreak of diarrhoea in Arviat, 59 individuals were medivaced to Churchill Health Centre. A child/adult was medivaced when:

a) the degree of dehydration required more intensive intervention then we were able to provide

b) complications of E. coli O157:H7 were evident

- anaemia

- fluid retention
- increasing irritability or lethargy
- decreasing urinary output
- hypertension
- increasing blood and/or protein in the urine
- combination of these signs and symptoms

In conclusion, although the Health Centre staff worked hard throughout this epidemic, we recognize the hard work the parents did in caring for their children and their contribution to help curtail the spread of the disease.

CHR Report

SUMMARY OF PRESENTATION DURING COMMUNITY REVIEW-MAY 92

BY OBED ANOEE, CHR ARVIAT HEALTH CENTRE

During summer of 1991, I was faced with a task I thought was ordinary day-to-day job for a CHR; I was asked to put posters on handwashing and cooking meat properly. This summary consists of my presentation during community review on May 6, 1991.

To start, I talked about what I was doing to help find source of infection. I did a lot of home visiting to collect water and food samples both at homes and stores with EHO's, etc. Also I assisted by interpreting for various professionals during home visits.

Public education for disease prevention was my top priority. I did school visits to present videos and posters on personal hygiene. I did a lot of radio announcements, updates and shows on prevention of E. coli O157:H7. When a Public Health Nurse was hired, we did a lot of home visits to affected families for support, to continue voluntary isolation and monitor patients with diarrhoea. A door-to-door campaign was initiated providing soap, fact sheet and answering questions to get message across.

There were also a lot of meetings, but I attended a few, with so much little time I had.

To close, I reminded the people of importance of prevention through handwashing and proper cooking of store bought meat like hamburger.

Letter to the Review

During the review, Bette Palfrey read a very moving letter from the mother of a child who died during the epidemic. The letter was intended to explain how this mother felt and how she was affected. The letter said;

> "My daughter died of hamburger disease last July. Around our house was very dirty water. I bought a fish from people. The fish didn't look like regular fish. The meat was white instead of red. I cooked it and we all ate it. My daughter visited the community hall that night and bought a microwave hamburger. The nurses came to see her later because of stomach pains and gave her Tylenol. The nurses asked us to come back if things got worse. She did get worse. On Saturday she kept going to the bathroom. She couldn't pee and passed blood. We went back to the Nursing Station on Sunday morning and stayed there. On Monday we left for Churchill. Two doctors examined her and said we had to go to Winnipeg. The doctors really paid close attention to her. They said it would take about 2 weeks for her to get better. He said why didn't you send her earlier? I was kind of afraid to keep going to the Health Centre.
>
> I think we need to be more clean, especially with water all around the houses. When we don't have phones could we have a CB to call the Nursing Station and have an Inuk on call to call the nurses? Ever since my daughter died we have tried to really be clean and wash every time we go to the bathroom."

Health Committee Presentation

Three Health Committee members talked about their involvement over the course of the outbreak. The first committee member said,"We tried to notify the people what was going on. We received advice on how to treat and how to help people. For myself, I was at summer camp at the time of the E. coli. Some of my relatives had the disease. When we came back the disease had died down. It was bad at the beginning because everyone was visiting everyone. We knew it was an unusual illness and we were told it was serious. We were told not to visit so much during the E. coli."

The second member said,"I am a new member. I think I will learn a lot when I am involved a little longer. I'm not really sure yet but I will learn. I really want to encourage people to listen to advice and to use medicines properly. Some people don't listen well. We should cooperate."

The third member indicated that there was a Public Health Nurse during the epidemic and asked if Arviat will have another one.

Hamlet Council Presentation

A representative from the Hamlet Council gave the following report:

The council needs to find out how it helped and we are looking for comments from the community.

During the outbreak we jotted down daily notes. We are going to review these daily bulletins. I was away until July 21st but on July 22nd I was at a weekend meeting on E. coli. We need to find out when the first meeting was because I can only tell you what I know. In July and August the CHR, nurses, KRHB and Council met together about what was happening. The Hamlet decided to close public areas. August 22nd the Council, Health Committee, CHR, recreation, housing and education met and Hamlet days, heritage day and the music festival were cancelled. The outbreak was the priority. Some meetings were cancelled. Isolation and closure of the school was recommended. The interagency committee presented to the Council about school closure but the education committee had already decided to open the school. Please feel free to add comments to what I've said.

We would like to have a person to contact when there are problems. We could have dealt with this in the proper way if we'd known earlier. We need to help each other. We were told we didn't have good leadership. That hurts us. We found out things from neighbours. When we're talking about social issues it's hard. We all went through hard times. We are open to comments. When you are fighting something you can't see it's hard and frustrating. It makes you want to yell. We're looking for solutions. The weather is getting warmer. Lets not be

mad with each other. Lets seek solutions.

Following the Hamlet Council presentation a member of the Health Committee stated, "I know the Hamlet did their part to try and help. I want to thank them. We need to learn from this."

APPENDICES

HEALTH PROMOTION MATERIAL

Extracted From: **Health Promotion Section**

GNWT Dept. of Health Report

APPENDIX 1

MATERIALS DEVELOPED AT REGIONAL LEVEL

Diaper Changing

Change babies' diapers on a solid surface like the floor or changing table. If you change diapers on a rug, the couch or the bed, it will be difficult to clean up the area well.

* After changing diaper, put it into the garbage.
* Clean changing surface with javex solution (one cup in a pail of water) to destroy germs.
* Wash your own hands thoroughly.

ALWAYS WASH YOUR HANDS TO KEEP HEALTHY!!

ᓈᖅᑎᔭᐃᓂᖅ

ᓄᑕᕋᓚᒥ ᓇᖅᑎᔭᐃᓂᐊᕈᐱᑦ ᐃᕐᒥᒃᓱᑎᐊᖅᑐᒥᒃ ᐃᓂᕐᑲᓗᑎᑦ ᓇᖅᑎᔭᐃᑦᑕᖅᓂᐊᖅᐳᑎᑦ ᓇᑎᖅᒥᓘᓂᒃ ᐃᒃᓕᒃᒥ ᓇᓚᐅᔭᐱᒥᓗ ᓇᖅᑎᔭᐃᓂᐊᖅᑐᓂ ᐃᕐᒥᓂᖅ ᐊᔪᓇᖅᓂᖅᓴᐅᒪ

ᓇᖅᑎᔭᐃᒐᓂᒃᑯᐱᑦ ᖅᑎᖅ ᐊᒃᑕᐱᒧᐊᖅᓗᒍ

ᓇᑦᑎᔭᐱᑎᓴᑲ ᔭᐱᓴᒧ ᐃᒪᖅᒥᑦ ᐃᓚᖅᑕᖅᓗᒍ ᐃᓗᖅᑲᓇᑦ ᑐᑯᓂᐊᒪᑕ

ᐊᑦᑲᒃᑎᑦ ᐃᑦᒥᑦᓴᐊᓇᐊᓚᖅᓗᑎᑦ

ᐊᑦᑲᒃᑎᑦ ᐃᒃᒥᑦᔪᐊᖅᑕᕿᑦ ᐃᓗᖅᑲᑏᓚᓂᖅᒧᑦ ᑐᕋᓂᐊᕋᐱᑦ

Handwashing Procedure for Families

Handwashing can prevent spread of diarrhea in families and to family friends.
All household members should wash their hands with soap:
* after they use toilet
* after they change a child's diaper
* after they help a child to use the toilet
* before eating
* before food preparation

To wash hands:
* wet hands with water
* rub soap into hands until you have a lather
* with water, vigorously rub hands together for thirty seconds
* rince thoroughly

Help small children to wash their hands
Always wash your hands to stay healthy

ᐊᑦᑕᒍᑦ ᐃᖏᓂᖅᑎ ᒪᓂᑕᕐᖏᑦ

ᐊᑦᑕᓂ ᐃᖏᕆᑕᑭᐱᑦ ᐊᓇᓪᓚᐱᓇᖅ
ᓄᖅᑲᓪᓂᐊᓇᔾᖅᒪᑦ ᖁᑭᑐᕕᓄᑦ ᐃᓪᓗᕐᔾᓂᓄᓂᑦ
ᐃᒃᓂᒥᐅᑕᕆᓂᕆᑦᑕᑦ ᐃᖏᐅᑎᒥᒃ ᐊᑐᖅᓂᑎᒃ ᐃᖏᒥᕈᐊᖅᖅᓴᑦ
* ᐊᓇᖅᐱᒥᑲᓂᔾᔪᖅᑎᓂᑦ
* ᓇᔾᕈᔾᔭᐃᑲᓂᔾᔪᖅᓂᒃ
* ᓄᑕᕿᒥᒃ ᐊᓇᖅᐱᒥᖅᑲᕐᔪᕿᓂᑎᒃ
* ᓂᕆᓂᐊᕿᖅᓂᑎᒃ
* ᓂᑦᑭᓪᓕᓂᐊᕿᖅᑎᓂᑎᒃ
ᐊᑦᑕᓂ ᐃᖏᓂ
* ᐊᑦᑕᐃᑦ ᑭᓂᑎᖅᑲᓗᔪ
* ᐃᖏᒥᐅᒍᑦ ᐃᖏᒥᐅᑎᐅᑕᖅᑕᓂᑎᑦ
* ᖅᑲᕿᐅᑎ ᐱᐊᓪᓕᖏᑦᑯᑎᓇᔾᑕ ᓇᕿᑭᓕᓗᔪ (30 seconds)
ᐃᖏᒥᓪᐅᖅᓂᑎᑦ
* ᐃᑭᑐᑕᐊᓪᓕᖅᓂᑎᑦ
ᓄᑕᖅᑦ ᒥᑭᓕᑦ ᐃᒥᓂᖅᒍᑦ ᐃᑲᓕᖅᑕᖅᓂᑎᑦ

ᐊᑦᑕᐅᑎᑦ ᐃᖏᒥᖅᑕᑭᑦ ᐃᓄᖅᑕᑯᓂᓂᖅᒍᑦ ᑐᕋᓂᐊᕋᐱᑦ

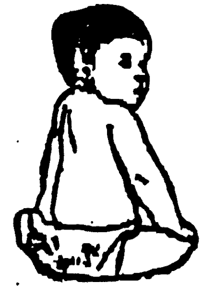
DIRTY HANDS SPREAD DISEASE WASH THEM

ᐃᐱᓗᓪᑦ ᐊᑲᓴᐃᑦ
ᐋᓐᓂᐊᓂᖁᒥᒃ
ᑐᓂᓯᓯᖁᒪᑕ
ᐃᖁᒥᒃᑭᑦ

DESIGNED BY:
OBED ANOEE (CHR)
SYLVIA MALA (C.N.A.)
ROB KIELLY (EHO)
ARVIAT, N.W.T. AUG/91

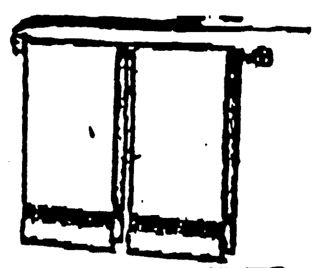
PROTECT YOUR HEALTH
ᐋᓐᓂᐊᕐᑕᐃᓕᒪᒋᑦ

AFTER USING THE BATHROOM OR CHANGING A BABY
ᐊᓇᕐᕕᖕᒥᖏᓂᒃᑯᕕᑦ ᓇᖅᑭᖅᑐᐃᖏᓂᒃᑯᕕᒡᔪᖅᓃᑦ



WASH HANDS THOROUGHLY WITH SOAP
ᐊᒡᒐᑎᑦ ᐃᕐᒥᐅᕐᒧᑦ ᐃᕐᒥᒡᓗᒋᑦ

USE CLEAN TOWELS
ᐊᒡᓚᕈᑎᑦ ᓴᓗᒪᓂᓗᐃᓐᓇᕐᓗᒋᑦ



HAVE CLEAN HANDS BEFORE PREPARING FOOD AND BEFORE EATING. BOIL DRINKING WATER FOR 10 MINUTES.
ᓴᓗᒪᓂᓗᒡᓗᒋᑦ ᐊᒡᒐᑎᑦ ᓂᕿᓕᓴᖅᑳᕐᑎᓐᓇᑎᑦ ᐅᒃᐸᔪᖅᓃᑦ ᓂᕆᖅᑳᕐᑎᓐᓇᑎᑦ.
ᐃᒥᖅ ᑎᖅᑎᒡᓗᒍ 10-ᒥᓂᑦᓯᒥᒃ. (ᑎᒃᑕᑦ ᖁᓕᑦ).

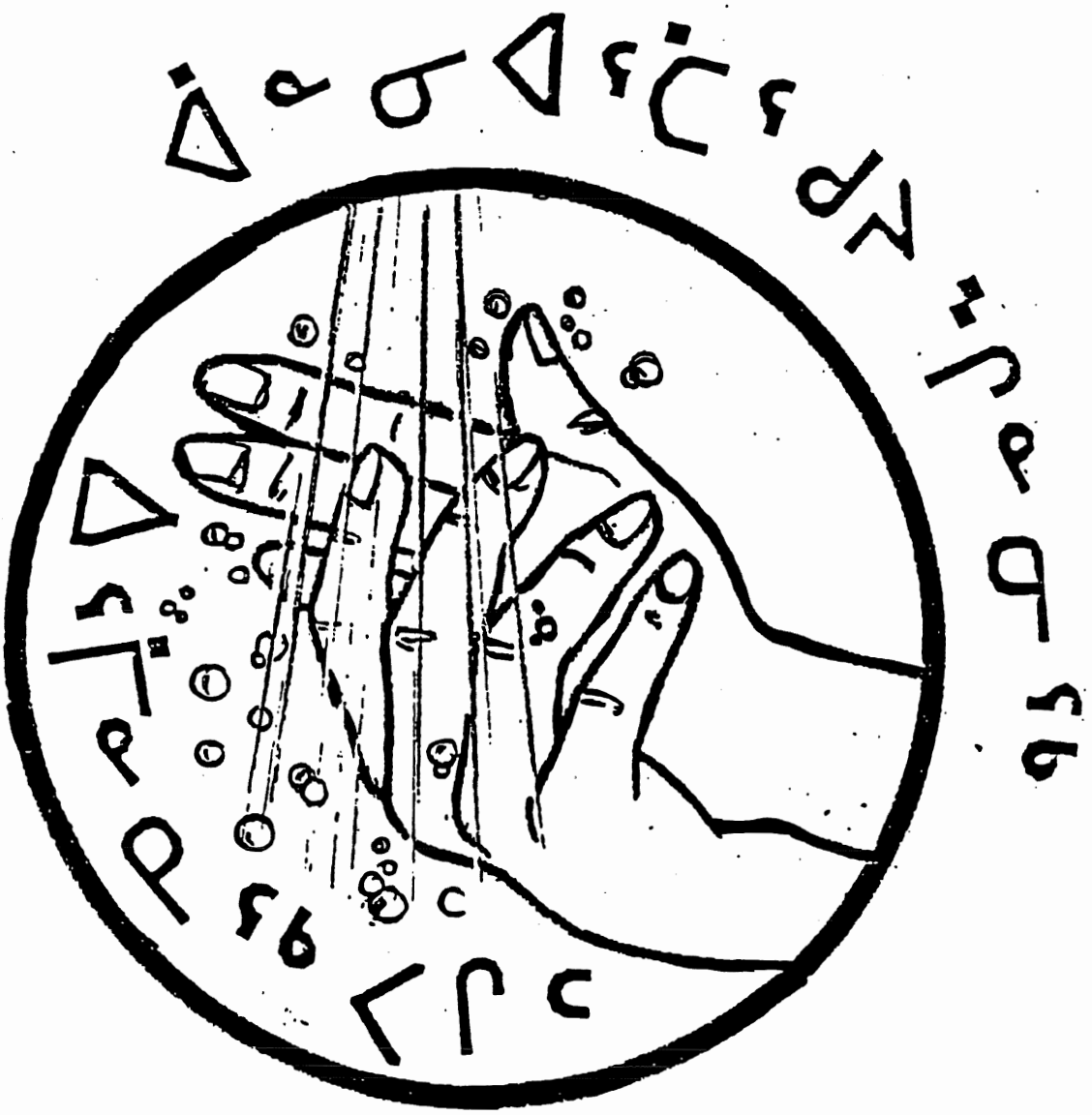
Adults and children who have diarrhea should contact the Health Centre. The nurse may give you a special drink, when mixed with the correct amount of water, will help you replace fluids lost from the diarrhea. Drink the fluids that are suggested by the nurse.

If the diarrhea gets worse, see the nurse again.

If you are feeling better, slowly increase your diet. Start with caribou broth, fish broth, chicken noodle soup , tea with sugar and apple juice.

APPENDIX 2

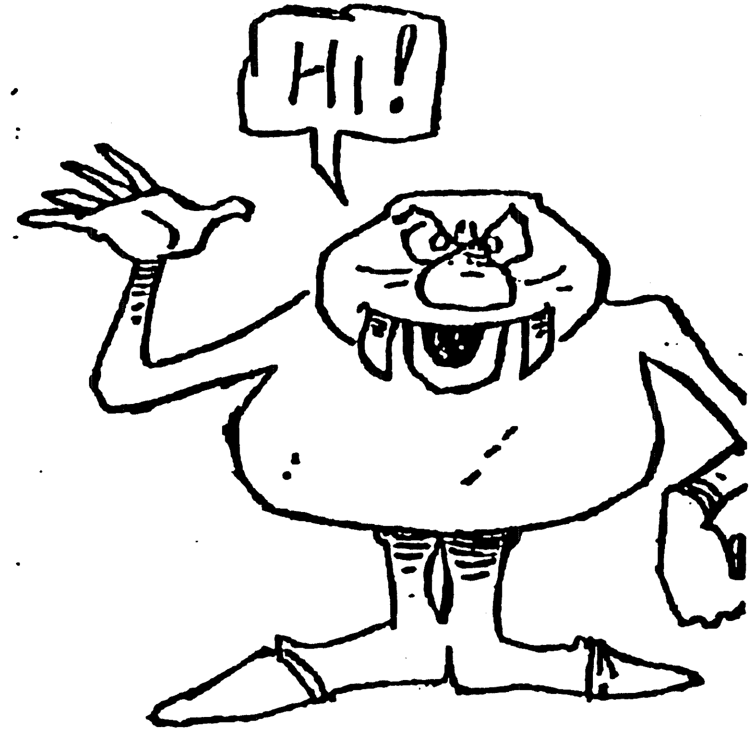
ADAPTED MATERIALS



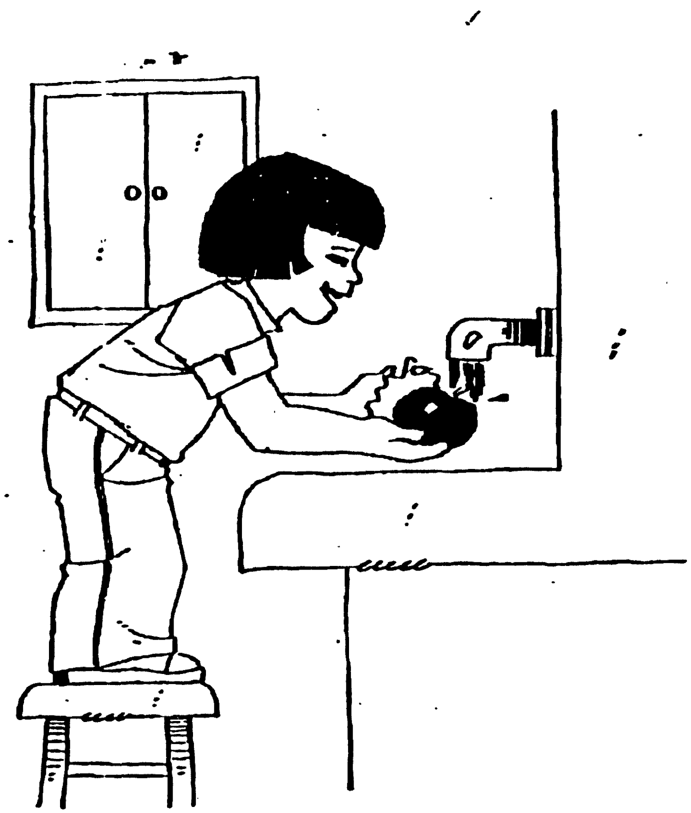
ADAPTED FROM:
HIBITANE (1991)

HIBITANE (1991)

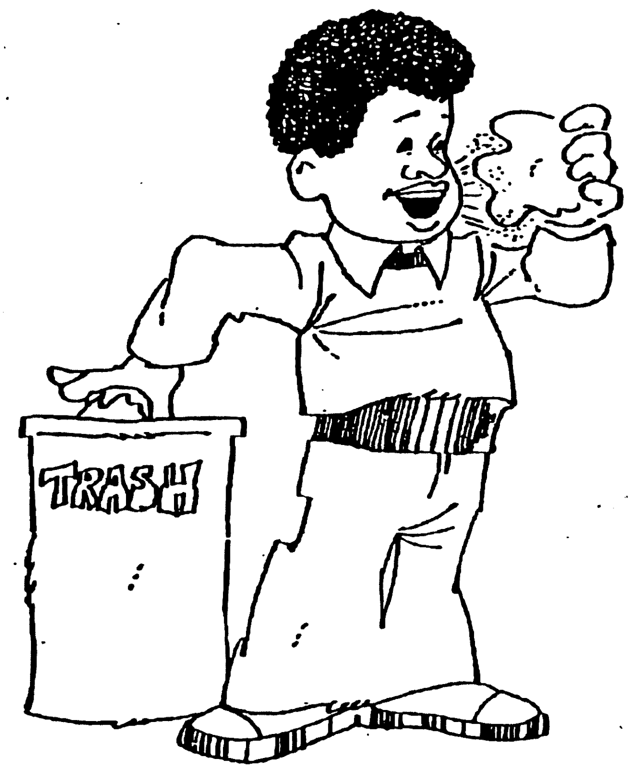
ᓄᓇᕐᔪᐊᕐᒥ ᑕᑯᓂᖕ ᐊᔪᖅᑕᐳᑦ ᐆᒪᔪᐊᕈᓯᐊᓗᒻᒪᑕ ᐊᒥᓱᒻᒪᓇᐊᓗᐃᑦ
ᒥᑭᓂᖕᓴᐅᕐᓗᑎᒃ ᖁᐸᓄᐊᓂᑦ ᐊᒻᒪᓗ ᒥᑭᓂᖕᓴᐅᕐᓗᑎᒃ ᐃᒍᑕᕐᔪᐊᓂᑦ
ᑕᒪᕐᖁᐊ ᐆᒪᔪᐊᕈᓰᑦ ᐃᐱᕐᒥ ᐊᒻᒪᓗ ᓴᓗᒪᐃᑐᓃᖅᑲᑕᖅᐳᑦ
ᓴᓗᒪᓯᐃᓇᕐᓂᖅ ᐃᑲᔩᑎᖏᑎᐊᖅᐳᖅ ᑕᐃᒪᖕᖑᓗᒃᑖᖅ.



ᐆᒪᔪᐊᕈᓯᓗᒃᑕᓂᒃ ᑕᑯᓂᖕ ᐊᔪᖅᑕᕐᑎᕐᓂᓗᒃᑖᖅ.

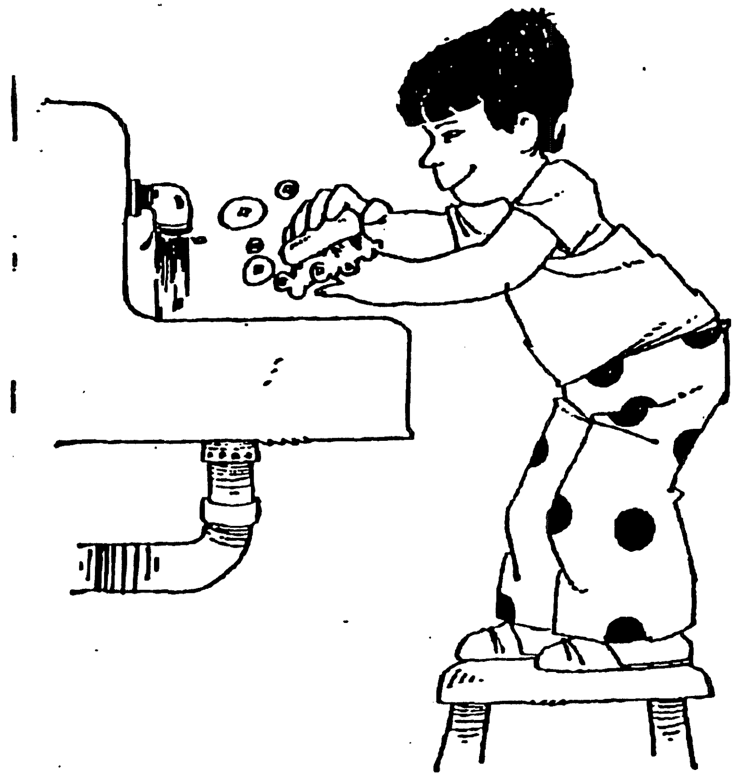


ᓂᓇᑦᑕᐃᓕᒻᒪᓇᒃᑯᓯ ᓂᕿᓂᒃ ᑲᑕᒃᓂᑯᐱᓂᕐᓂᒃ ᓇᑎᕐᒧᑦ
ᐃᕐᒥᖅᑕᕐᓗᒋᑦ ᐱᕿᖅᑐᐱᓃᑦ ᒪᒪᖅᑐᑦ ᓂᕿᑎᐊᐸᐃᑦᓗ ᓂᐅᐱᕐᐱᔅᒥᑦ
ᓂᐅᐱᖅᑕᐅᔭᐱᓃᑦ ᐃᕐᒥᐅᒥᒃ ᐃᒪᖅᑎᐊᕐᓗᒍ ᐊᒃᑲᑎᑦ ᐃᕐᒥᑎᐊᖅᑕᕐᓗᒋᑦ
ᐆᒪᔪᐊᕈᓯᑦ ᑕᑯᒃᓴᐅᖏᑐᑦ ᓇᓂᕈᓱᖅᑐᐊᓗᒻᒪᑕ ᓇᓃᒻᒪᖕᒪᑕ ᖃᐅᔨᒪᖏᑕᕐᑎᓐᓂ.



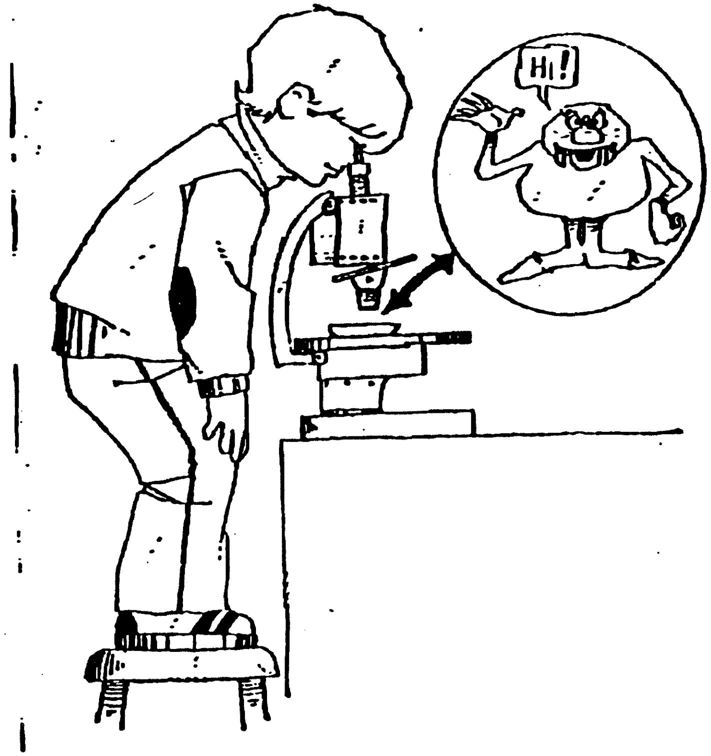
ᖁᐃᖅᑐᕈᐱᑦ ᐅᕝᕙᓘᓃᑦ ᑕᕆᐅᑯᐱᑦ ᑎᑦᑐᐊᖅᑎᑦᑎᑐᑎᑦ
ᐊᓂᕐᓂᒧᑦ ᐆᒪᔪᐊᕈᓯᕐᓂᒃ ᐆᒪᔪᐊᕈᓯᕐᓂᒃ ᑕᑯᒃᓴᐅᖏᑐᓂᒃ
ᑭᓇᑐᐃᓇᕐᒧᑦ ᐱᔭᒪᖏᑕᖏᕐᓂᒃ ᑐᓂᓯᔭᓇᖅᑐᑎᑦ
ᐃᓯᒪᓕᐅᑎᐊᕐᔪᖅᑐᑎᑦ ᑲᑭᐅᑎᒃᓯᓂᒃ ᐱᓯᒪᖃᑕᕈᐱᑦ
ᐃᒋᖃᑕᕐᓗᒋᑦ ᑲᑭᐅᑎᐱᓃᑦ ᐊᑐᐊᓂᑲᕐᖓᕐᓂ ᐊᒃᑕᕐᐱᕐᒧᑦ.

ᑕᑯᓚᐅᖅᓯᒪᕚᑦ ᐆᒪᔪᐊᕈᓯᕐᓂᒃ ᑕᑯᒃᓴᐅᖏᑐᓃᒃ?
ᐅᖑᐊᖅᐸᒃᑯᑎᒃ ᐊᒻᒪᓗ ᐊᐅᓚᕙᒃᑯᑎᒃ
ᑭᓯᐊᓂ ᐅᑲᓂᒃ ᐃᓯᒪᒃᔪᖏᓚᑦ
ᓴᓗᒻᒪᑦᑎᐊᕐᓂᐊᕋᒪ.



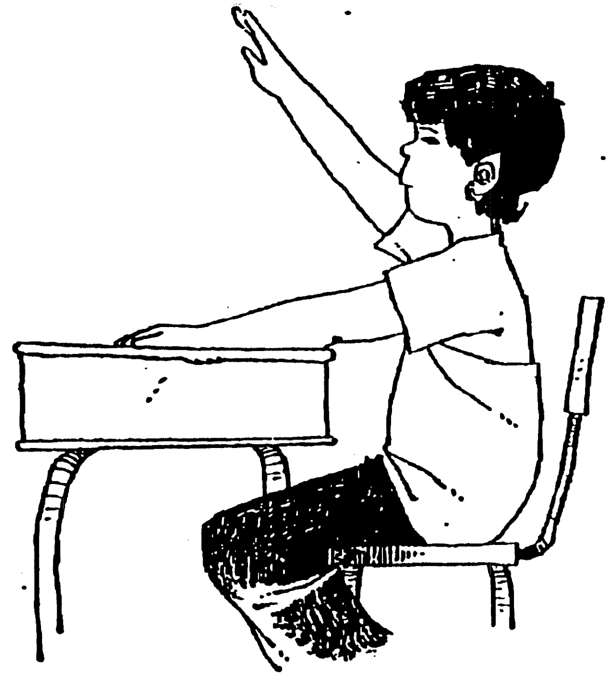
ᑯᑭᑎᑦ ᑕᑯᕆᐊᑎᐊᓚᐅᑭᑦ ᓱᓇᓂᒃ ᑕᑯᔪᓐᓇᕐᒪᖔᐲᑦ
ᓇᐃᑦᑐᑕᐅᕘᑦ ᐊᒻᒪᓗ ᑕᑯᔪᒥᓇᖅᕙᑦ ᐅᑦᑲᑦᑑᑲ ᑕᑭᔫᑦᑲᑦ ᐃᑲᒃᑯᑎᒃᑯ?
ᐊᕆᐊᕙᑕᕐᓗᕆᑦ --- ᑭᖕᒪᕙᑕᕝᕆᓪᓗᕆᑦ! ᐊᑐᕙᑕᕐᓗᑎᑦ ᑯᑭᖕᖑᑦ ᐊᓪᓚᒌᑎᓂ
ᑐᐊᐱᐊᓗᒃᑯᓗᑎᑦ ᐃᕐᒥᕙᑕᕐᓗᑎᑦ ᓴᓗᒻᒪᑎᐊᕐᓂᐊᕐᒪᐱᑦ.

ᑕᓪᓕᒃᓯᒪᔭᕋᖓᒪ ᐃᖅᐅᒪᐃᓇᖅᑕᖅᐳᖓ ᑕᓪᓕᖕᓂᖅ ᑕᑯᒃᓴᐅᔪᓐᓇᐃᖅᑎᓪᓗᒍ
ᒪᑐᑎᒃᓴᒧᑦ ᐅᑉᐸᓘᓃᑦ ᓂᕿᒥᒃᑐᒧᑦ ᐊᓐᓄᕋᒃᓴᒧᑦ
ᕿᑎᒋᐊᖅᑐᓕᕋᖓᒪ ᑕᐃᒪᓐᓇ ᐃᐱᖅ ᐃᑎᑉᔭᖏᓐᒪᑦ ᑕᓪᓕᖕᓂᓐᓄᑦ
ᑕᓪᓕᖕᓂᖅ ᐋᓐᓂᐊᓕᕿᑕᐅᑐᐃᓇᓇᐊᖅᑲᕐᒪᑦ ᑕᑯᒃᓴᐅᑐᐃᓇᖅᑕᑦ.

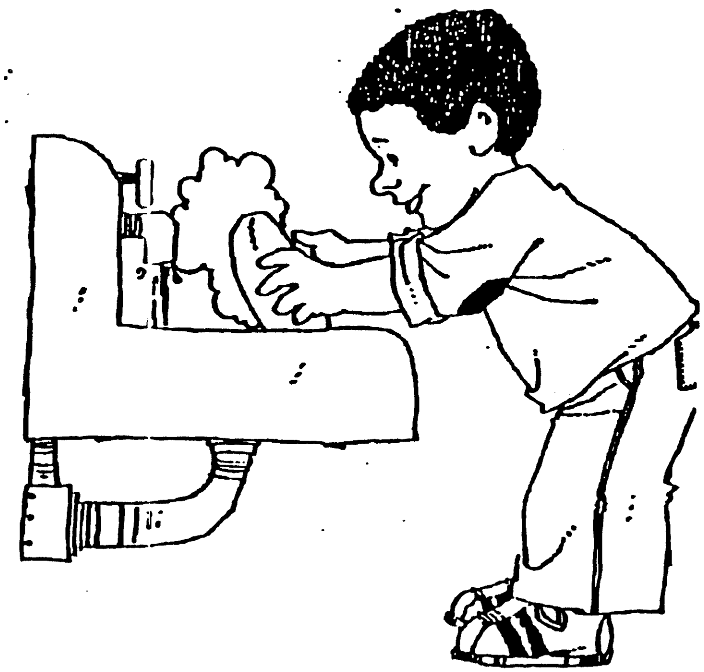


ᐱᐅᓛᖑᐳᖅ ᐊᓪᓚᖅᑎᕐᓂᐊᕿᕕᑦ ᐃᕐᒥᐅᑎᖅᑎᐊᖅᑐᒧᑦ
ᑕᑯᒃᓴᐅᑎᐊᕐᒪᑦ ᕿᖑᑎᑎᒍᑦ ᓇᒻᒥᓂᖅ ᐃᓱᓐᓄᑦ
ᑕᑯᔪᓇᕐᑎᐊᕋᕕᑦ ᐆᒪᔪᐊᕿᓯᕐᓂᒃ ᑕᑯᒃᓴᐅᖏᑐᓂᒃ ᐃᓱᒧᑦ
ᑕᐅᑐᒍᑎᖏᑦ ᕿᖑᑎᐅᑉ ᓴᒃᓗᓚᐅᖅᓯᒪᖏᓐᒪᑕ.

ᐊᓇᕐᐱᕝᒥᒃ ᑯᐱᑎᑦᑎᒍᐱᑦ ᐱᐊᓂᒐᔭᖕᓇᐱᑦ
ᑕᒃᑭ ᑖᒃᓇ ᐊᑉᐳᒍᐊᖅ ᑕᑯᒃᓴᐅᑎᑕᐅᔪᖅ
ᑯᐱᒃᐸᑖ ᐊᒃᒧᑦ ᐊᔭᑐᐃᓇᕐᓗᒍ, ᐊᒃᑐᐊᕐᐸᑐᐃᓇᕐᓗᒍ
ᐊᒃᓱᕈᕐᓇᕐᓕᖅ ᖃᐱᐊᓱᒃᑎᑦᑎᐸᒪᓂᕐᒧᑦ ᑭᑐᑐᐃᓇᕐᓂᒃ,

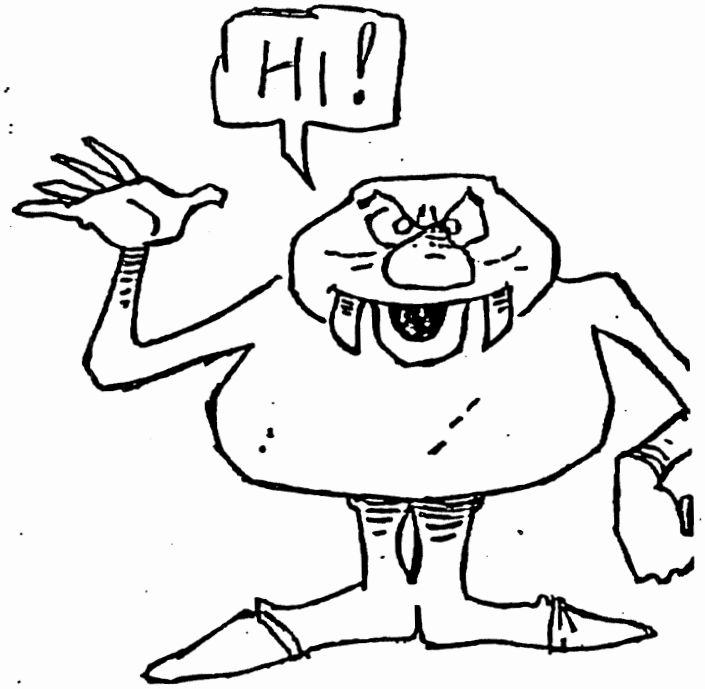


ᐊᓇᕐᐱᒃ ᒧᐊᕈᒪᓕᑐᐊᕋᕐᒐᐱᑦ
ᑖᓖᑦ ᐃᓯᑐᐃᓇᕐᓗᒍ, ᐃᓕᖕᓂᐊᕐᑎᑦᑎᔮᑦ ᖁᐅᔭᓂᐊᕐᒪᑦ
ᐊᑐᓇᐊᕙᖅᑕᐃᓇᓇᒐᕐᑎᒍ ᑕᒪᓇ
ᑲᖏᔪᖕᒍᑎᑦ ᐊᓇᕐᐱᒃ ᒧᐊᓇᐊᕐᑲᓕᑐᐊᕋᕐᒐᐱᑦ.



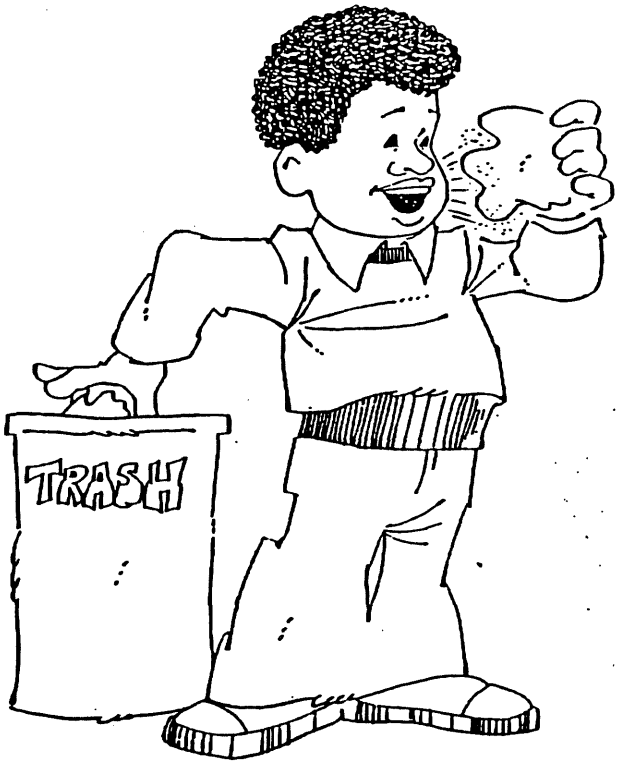
ᐊᒡᒐᑎᑦ ᐃᕐᒥᑎᐊᖅᑕᕐᓗᒋᑦ ᓇᒨᖕᐅᓚᐅᖅᑎᓇᑎᑦ
ᐳᐃᔪᖅᑕᐃᓕ·ᓂᐊᖅᐳᑎᑦ ᐊᑎᒋᕕᑦ ᐊᐃᖏᒃ ᐃᒧᑎᐊᕐᓗᒋᒃ ᐃᕐᒥᒋᐊᕈᕕᑦ
ᐃᕐᒥᐅᑕᐅᑦ ᐱᐅᓯᑎᓐᓂᐊᕐᕿᓂᑦ ᐊᒻᒪᓗ ᐃᐸᔪᓐᓇᐃᖅᑎᓐᓂᐊᕐᕿᓂᑦ
ᐃᐱᖅ ᑕᑯᓂᖅ ᐊᔪᖅᑕᐳᑦ ᐲᑎᐊᕋᔭᕐᒪᑦ ᑕᐃᒪᓇ

There's a germy world that we can't see
Smaller than a bird and smaller than a bee
These creatures lurk in dirt and grime
So it pays to be clean all of the time.



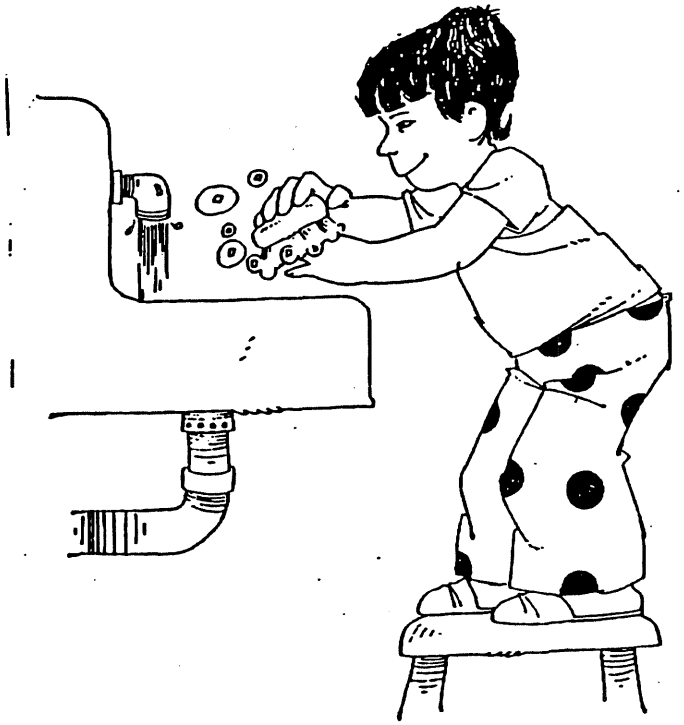
ALL ABOUT GERM

Never eat food that has dropped on the floor
Wash fruits and vegetables brought from the store
Use soap and water to wash your hands well
Germs are in more places than we can tell!



When you cough or sneeze you spray the air
With germs that nobody wants to share
Carrying tissues would be a good plan
Then throw out the used ones in the trash can.

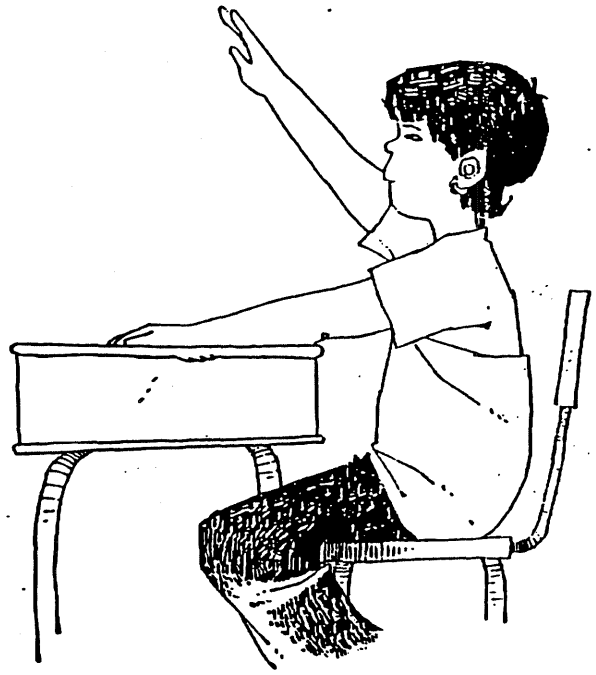
Did you ever see a germ?
They wiggle and they squirm
But they won't bother me
'Cause squeaky clean I'll be.



Look at your nails and see what we see
Are they short and neat-or long and dirty?
File --- don't bite! And use a nail brush
Leave plenty of time so you don't have to rush.

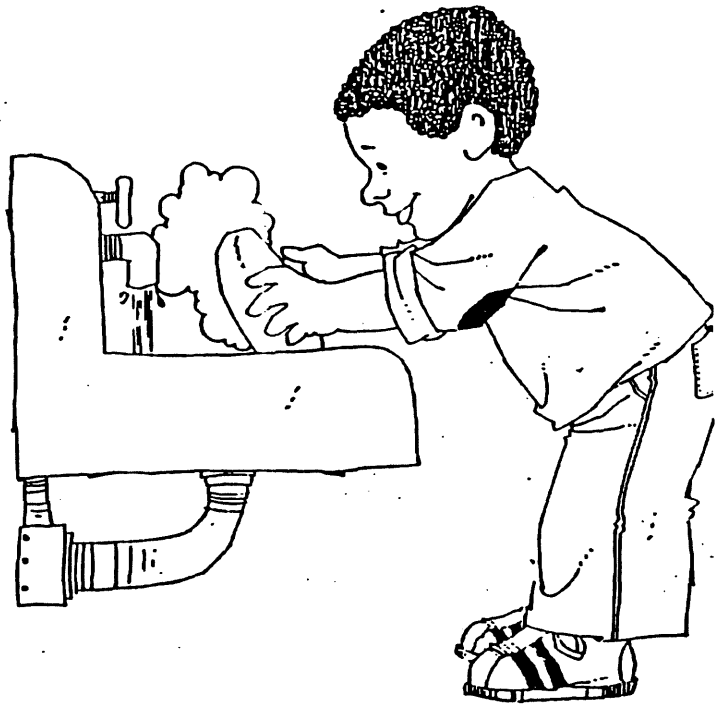
I always remember to cover my scratch
With a bandage or a soft gauze patch
So dirt can't get in when I go out to play
'Cause a scratch can get infected that way.

The best reason to scrub with soap
Is right under a microscope
See the germs with your very own eyes?
The lens of the microscope never lies.

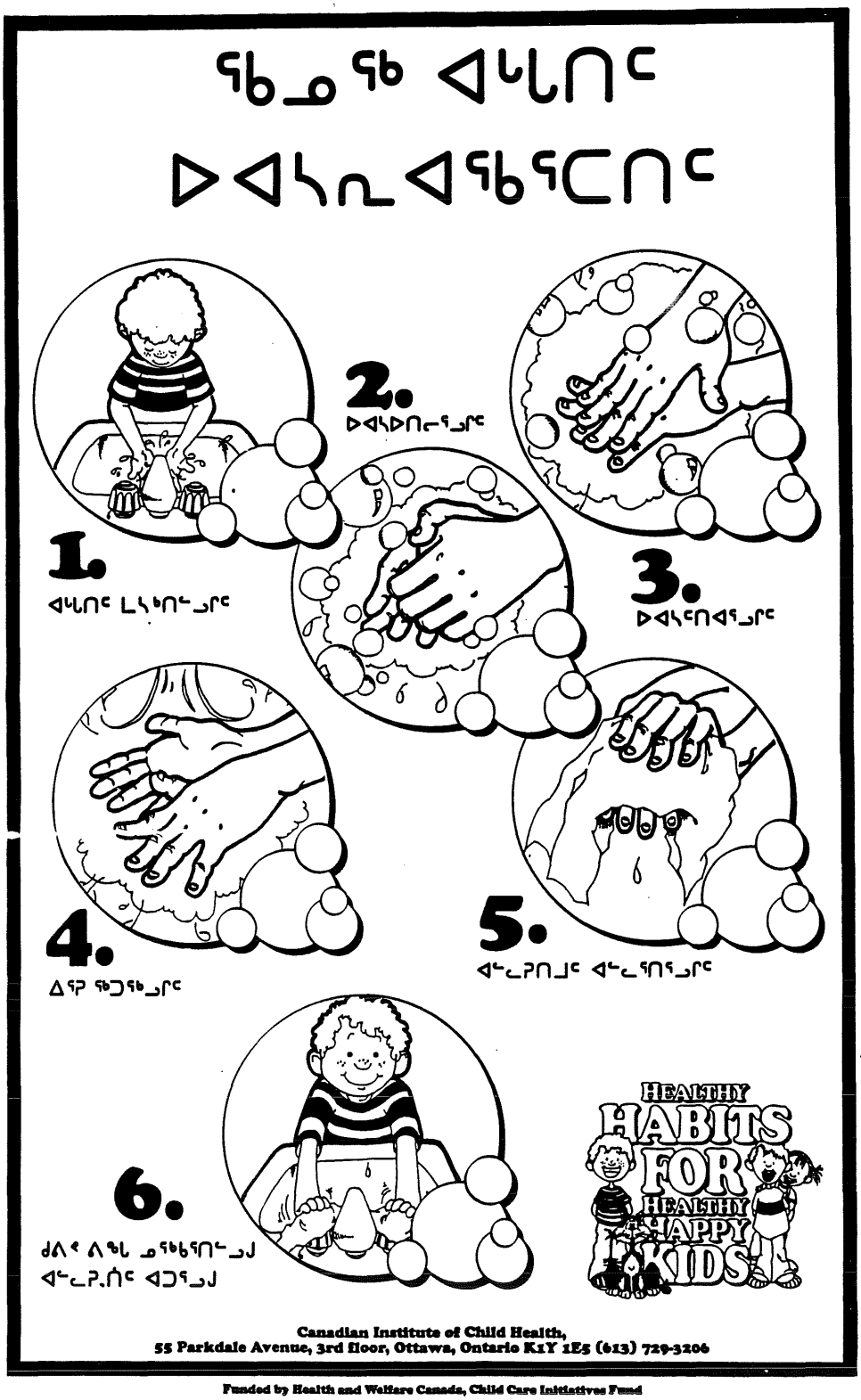


When you feel the urge to go
Raise your hand so teacher will know
It's a normal thing we all must do
So don't be shy when it happens to you.

Until you flush you're not really through
That's why this picture is in your view.
Just push down the lever, all it takes is a touch
To make everyone happy, it isn't so much.



Please wash your hands before you leave
And don't forget to roll up your sleeve
The soap will make you nice and clean
And get rid of the dirt that can't be seen.



Canadian Institute of Child Health,
55 Parkdale Avenue, 3rd floor, Ottawa, Ontario K1Y 1E5 (613) 729-3206

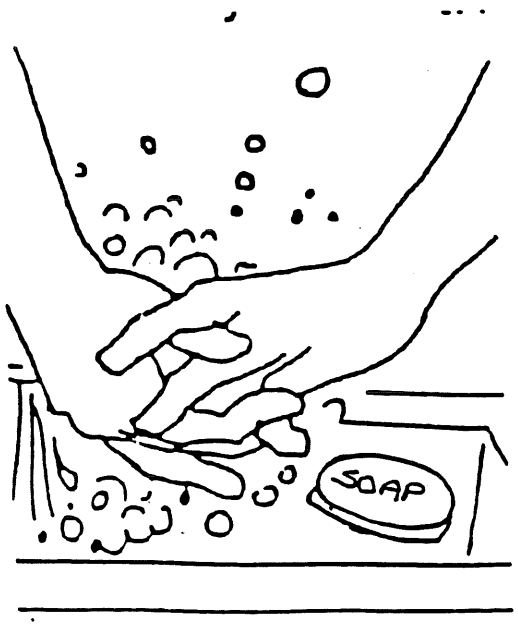
Funded by Health and Welfare Canada, Child Care Initiatives Fund

APPENDIX 3

ORIGINAL HEALTH PROMOTION SECTION MATERIALS

PROTECT YOUR HEALTH

WASH YOUR HANDS



BEFORE PREPARING FOOD

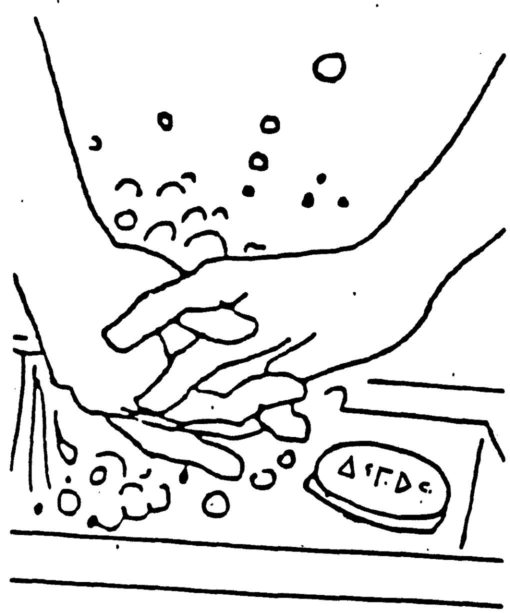
BEFORE EATING

AFTER USING THE TOILET

AFTER CHANGING DIAPERS

ᐃᖕᒥᓂᒃ ᑲᒪᕐᑎᐊᖃᑦᑕᕐᓗᓯᑦ

ᐊᒡᒐᓯᑦ ᐃᕐᒥᕐᑎᐊᖃᑦᑕᕐᓗᒋᑦ



ᓂᕿᓕᓇᕐᖄᕐᑎᓐᓇᓯᑦ

ᓂᓇᕐᖄᕐᑎᓐᓇᓯᑦ

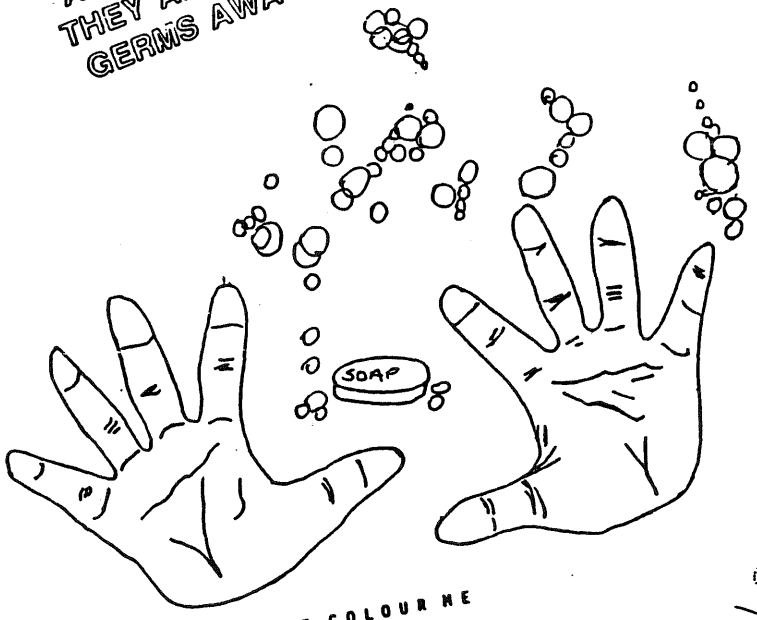
ᖁᕐᕕᒃ ᐊᑐᐊᓂᒃᑳᖕᒐᓯᐅᒃ

ᖁᐃᓂᓕᑕᓕᓇᐊᓂᒃᑳᖕᒐᓯᑦ

KEEP ON WASHING!

WHEN I LOOK IN THE MIRROR
WHAT DO I SEE?
SOMEONE LOOKING BACK
WHO LOOKS JUST LIKE ME!
SOMEONE WHO WASHES THEIR HANDS
AND THEIR FACE
SOMEONE WHO KEEPS DIRT
AND GERMS IN THEIR PLACE
WHEN YOU LOOK IN THE MIRROR
I HOPE YOU SEE
SOMEONE CLEAN AND HAPPY
JUST LIKE ME!

LOTS OF BUBBLES
ARE FUN FOR PLAY
THEY ALSO HELP TO CHASE
GERMS AWAY!



PLEASE COLOUR ME

SOAP. DON'T LEAVE HOME WITHOUT IT!

USE SOAP EVERY DAY - KEEP THE DOCTOR AWAY

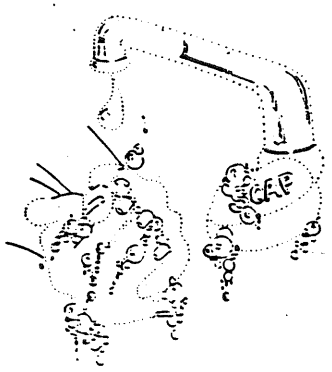
FILL IN THE BLANKS:

__ A N D S
G __ R M S
S O __ P
C __ E A N
__ O U C H
W A S __
H A P P __

NOW MAKE A BIG WORD WITH THE LETTERS FROM THE SPACES

_ _ _ _ _ _ _ _

HINT: IT IS SOMETHING WE ALL WANT TO BE!



Join the dots and colour it in too!

WORD SEARCH PUZZLE

C	B	X	H	E	A	L	T	H	Y	R	D
L	A	U	P	Q	R	G	E	R	M	S	M
E	C	O	R	I	N	S	E	S	S	I	L
A	T	O	W	E	L	N	T	B	D	N	H
N	E	S	T	T	W	O	H	K	R	K	T
M	R	C	A	P	A	T	L	M	P	X	O
O	I	E	Y	P	S	C	R	U	B	N	L
H	A	B	C	O	H	D	E	I	F	G	C
S	D	N	A	H	H	T	I	J	D	K	E
U	L	P	M	N	O	E	O	P	Q	R	C
R	S	R	E	T	A	W	T	O	H	T	A
B	U	B	B	L	E	S	U	V	T	Z	F

WORD SEARCH CLUES

BACTERIA
BRUSH
BUBBLES
CLEAN
DIRT
DRY
FACE CLOTH
GERMS
HANDS
HEALTHY
HOT WATER
RINSE
RUB
SCRUB
SINK
SOAP
TAP
TEETH
TOOTH PASTE
TOWEL
WASH
WET