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Accidents in Childhood:  
A Report on 17,141 Accidents

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ABSTRACT

The causes of injury to 17,141 children brought to the emergency department of a large pediatric hospital in one year were studied. The leading causes of injury were: falls, 5682; cuts or piercings, 1902; poisonings, 1597; and transportation accidents, 1368. Included in these are 587 falls on or down stairs, 401 cuts due to glass, 630 poisonings from household or workshop substances, 510 poisonings from salicylate tablets, and 449 accidents involving bicycles or tricycles. Other findings included 333 injuries to fingers or hands in doors, usually car doors; 122 instances of pulled arms; 384 ingestions and 53 inhalations of foreign bodies; 60 alleged sexual assaults, 58 chemical burns, 127 wringer injuries, and four attempted suicides. A rewarding opportunity in accident prevention exists for hospitals that undertake to compile and distribute pertinent source data.

SOMMAIRE

L'auteur examine les causes de blessures chez 17,141 enfants qui ont été emmenés durant une année à la salle d'urgence d'un grand hôpital pour enfants. Les principales causes de blessures ont été: 5682 chutes, 1902 coupures et plaies pénétrantes, 1597 intoxications et 1368 accidents provoqués par des moyens de transport. Sont compris dans ces chiffres 587 chutes sur ou dans des escaliers, 401 coupures par du verre, 630 cas d'intoxication par des produits ménagers ou industriels, 510 cas d'intoxication par des comprimés de salicylate et 449 accidents causés par des bicyclettes ou des tricycles. D'autres statistiques précisent que parmi les blessures, on comptait 333 blessures des doigts ou des mains par des portes, surtout des portes d'auto, 122 cas de traumatisme par étirement des bras, 384 cas d'indigestion et 53 cas d'inhalation de corps étrangers, 60 cas de prétendues attaques sexuelles, 58 cas de brûlures chimiques, 127 cas de blessures dans une essoreuse et quatre tentatives de suicide. Les hôpitaux qui entreprennent de recueillir et de publier des statistiques pertinentes sur le sujet peuvent apporter une contribution remarquable à la prévention des accidents.

ACCIDENTS are recognized as the leading cause of childhood deaths over the age of one year. Not so familiar is the scope of non-fatal injuries, despite the establishment of poison control centres in North American hospitals and despite excellent publications such as those of the Boston Children's Hospital and the Saskatchewan Department of Health.

The Hospital for Sick Children, Toronto, is a pediatric hospital of 800 beds in whose emergency department 40,025 children were examined or treated in 1962, when the number of beds was 610.

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Most though not all of the children coming to the Emergency Department are from Metropolitan Toronto, which has a population of 1,600,000. A trial study made in 1960 convinced us that our emergency records held real possibilities in describing the nature of childhood accidents and so aiding in their prevention. To the emergency records for 1962 the emergency nursing staff added the nature of the accident as described by the parent, and the

records became the source data on 17,141 accidents. A preliminary report based on the records of 8534 injured children seen in the first six months of 1962 was displayed at the 1963 Conventions of the Ontario Hospital Association and the Ontario Public Health Association and is being made available throughout Canada by the Ontario Safety League.

From the emergency records with an added notation as to cause of accident, the medical records department prepared handwritten slips, one slip for each of the 17,141 cases. The nature of the accident and resultant injury were entered on the slip, along with the history number of the patient, the sex and age, the date of injury, and the severity of the injury. The last entry on the slip was a quotation of the nurse's record of how the accident occurred. These written slips, all 17,141 of them, were sorted by hand into groups as shown in Table I. This table shows a frequency ranging from 5682 falls to 19 self-inflicted injuries. It also shows the most frequent types of accident within each of the groups.

TABLE I.—LEADING CAUSE GROUPS AND LEADING SPECIFIC CAUSES OF 17,141 INJURIES EXAMINED OR TREATED IN THE EMERGENCY DEPARTMENT OF THE HOSPITAL FOR SICK CHILDREN IN 1962

Frequency	Causes	Specific Causes
5682	Falls	589 from furniture, 587 on or down stairs
1902	Cuts or piercings	401 due to glass, 271 due to nails, tacks, screws
1597	Poisonings	630 household or workshop substances, 510 salicylate tablets, 448 other medicines
1368	Transportation	828 involving cars and trucks, 449 involving bicycles or tri-cycles
1130	Bumps and blows	464 from falling or projected objects
1122	Sports accidents	231 playing ball, 85 swimming accidents
943	Other specified accidents	333 from fingers or hands in doors, 122 pulled arms
823	Foreign bodies	384 swallowed, 150 in eyes, 136 in nose, 85 in ears, 53 inhaled
702	Animals or insects	476 dog bites, 98 insect bites, one catfish bite on buttock
604	Violence by other persons	283 fighting or wrestling, 140 by rocks and stones, 60 alleged sexual assault
554	Burns	257 from hot liquids, 66 from stoves or appliances, 58 chemical burns from household substances, e.g. lye
152	Involving machinery	127 wringer injuries
19	Self-inflicted injuries	12 in hitting or kicking others, 4 attempted suicide (three with pills, one with a gun, all unsuccessful)
543	Unspecified	

Samples were taken of other particulars. As expected, the warmer months are highest, the peak month being May with 1879 injuries due to accidents or violence. The increase during the summer months was general throughout all major classifications.

Sixty-two per cent of the injuries happened to boys, and the most dangerous age in children of both sexes was two to three years. These toddlers suffered 24% of the accidents recorded for children up to age 14. Studies were made of severity of injury as indicated by advice only, treatment in emergency, admission as an in-patient, or death. The studies highlighted the seriousness of transportation accidents, poisonings, burns, and the inhalation of foreign bodies. A study by time of day disclosed that the late afternoon and evening hours hold higher risks.

This study was undertaken primarily for the purpose of accident prevention. It is our belief that within the medical record indexes of many Canadian hospitals lies information which could be of value in the prevention of accident or disease. A hospital can and should contribute to a community's knowledge and awareness of its health problems. Moreover, the hospital should make its findings available generally to other organizations and interested persons who might be better able to bring them to public attention.

#### FINDINGS IN PRESENT STUDY

A listing of the major findings is provided in Table I, arranged in order of frequency, and the following discussion is arranged in the same order. The major findings were astounding and alarming because of their variety, severity and frequency. To name a few examples—a great variety of household substances was involved in the poisonings, chemical burns were a cause of severe injuries, and a large number of children suffered from pulled arms.

#### Falls (5682)

There were 589 falls from furniture and 587 on or down stairs. Other major causes of injury in this category were 261 falls on or against furniture, 224 on ice, and 214 on glass. Two hundred children fell from playground equipment. Falls from fences, walls and trees injured 130 children. Even more alarming is the fact that 122 children were injured in falls from heights, such as roofs, windows, and balconies.

The incidence was highest during the outdoor months of May through October. A sampling as to the severity of injury indicated that almost 10% of the children injured through falls required in-patient treatment. One died owing to a fall from a second-storey verandah.

Eighteen children fell with objects like spoons, bottles, sticks, or can-openers in their mouths. Some incidents would be amusing if they were not so serious. For example, one child fell downstairs and was hit on the nose by a suitcase which had followed him down. The dangers of stairways, climbing upon furniture, and broken glass are obvious but all too often overlooked.

### *Cuts and Piercings (1902)*

Accidents from sharp objects were twice as frequent during the months of May through August. During the year there were 401 due to glass, 271 due to nails, tacks or screws, 106 to knives or razor blades, and 97 due to slivers. About 3% of the children were admitted.

The point of entry of the sharp object was frequently an eye, the roof of the mouth, or an ear. Many of the accidents due to glass involved windows and doors. In July and August alone, 25 children were injured in this way. Large clear areas of glass, particularly those extending to the floor, should be interrupted sufficiently to make it obvious that there is glass in the opening. Even a stencil placed on the glass at the child's eye level might prove sufficient. A large number of injuries were due to children stepping on broken glass.

### *Poisonings (1597)*

There appears to be no closed season on poisonings. Every month, every day, has its hazards. Practically all of the 1597 poisoned children seen in 1962 had swallowed household or workshop substances (630), salicylate tablets (510), or other internal medicines (448). Poisonings are serious accidents. In-patient treatment was necessary for 230 children, over 14% of the total. There were four deaths, one from digoxin, two from salicylates, and one from a gasoline-type cleaning agent.

There is no substitute for strict security of toxic substances in the home or garage. The best approach is to consider it normal for any child to eat or drink anything he can reach or climb to. The patients who swallowed lye, perfumes, cigarettes, moth balls and furniture polish illustrate the danger of leaving household substances within reach. It is particularly hazardous to place toxic fluids in pop bottles.

### *Transportation Accidents (1368)*

Transportation accidents were highest in the summer months. The 828 accidents involving cars and trucks, the 449 involving bicycles and tricycles (including 354 falls), and the 53 involving public transportation accounted for almost all of the accidents in this category. Transportation accidents ranked highest in severity as measured by admissions and deaths. Over 21% of the children were admitted and eight deaths were recorded.

Some of the details are enlightening. Four hundred and twenty-six children were hit by cars or trucks and 31 bicycle riders struck or were struck by cars or trucks. Fourteen children fell from trucks and 12 from wagons. Eleven were hit by Canadian National Exhibition "trains" and five fell from these vehicles. Three children fell from tractors, two were run over by tractors, and one was crushed between a tractor and a wagon. It would appear

that emphasis should be placed upon the 426 children who were struck by cars or trucks—more than one child per day.

### *Bumps and Blows (1130)*

Injuries due to falls from furniture have already been mentioned. An additional 250 children were hurt by bumping into furniture. Four hundred and four bumped into other things and 464 received blows from falling or projected objects. One could furnish a house with the objects bumped into, and equip the play yard as well. This "danger home" would have a preponderance of tables (103) and swings (62) and would be somewhat untidy with 43 sticks and an assortment of 30 bars and posts and pipes. The children in this "danger home" would be wise to wear safety goggles as a protection against BB pellets and other flying or sharp objects.

### *Sports Accidents (1122)*

Sports accidents are high in December and May, and more than double the average in January (209) when various winter sports accounted for most of the sports injuries—hockey 58, skating 58, and others 71. Playing ball caused the most injuries, as 231 children were hurt in this way. There were 85 swimming accidents and 46 gym accidents. None of the 1122 patients died, and only 6% became in-patients. Heads and fingers received most of the impact of the various objects involved in sports and games.

### *Other Specified Accidents (943)*

In the miscellaneous group two types of accidents predominate. Painful injuries were received by 333 children who caught their fingers or hands in doors, some resulting in partial amputation. About one-third of the door injuries were from car doors. The second and surprisingly large group of 122 children suffered from pulled arms, often resulting in dislocation of the elbow, a danger of which parents do not seem to be aware.

### *Foreign Bodies (823)*

There were 384 children, more than one a day, who swallowed foreign bodies such as coins (105), glass, safety pins, tacks, screws, bobby pins, whistles, keys, toys, buttons, and marbles. One hundred and fifty children were seen for removal of foreign bodies from eyes. Foreign bodies in the nose totalled 136 and usually consisted of smooth round objects such as buttons, beans, nuts, chewing gum, stones, crayons, erasers, and paper or paper tissue. Removal of foreign bodies from the ears of 85 patients yielded a similar collection of articles.

Fifty-three children were seen in emergency because of inhalation of foreign bodies, including those who had inhaled water—two in near-drownings and one drowning. Of the remaining 50, 19

inhaled peanuts. These are real hazards and should never be given to children under five years of age. Even though the classification of foreign bodies excludes toxic substances already reported under poisonings, there were 823 children in this group.

An incredible collection of inhaled or swallowed objects has been mounted and framed by the hospital's otolaryngology department and is exhibited at the entrance to the ear, nose and throat operating suite. Sixteen per cent of the children aspirating or ingesting foreign bodies required in-patient treatment, indicating the seriousness of this type of accident.

#### *Injuries by Animals or Insects (702)*

Two-thirds or 476 of the children injured by animals or insects had suffered dog bites. This type of injury is more common in the spring, summer and autumn when children and dogs are more likely to be outside. Twenty-two other children were scratched or otherwise injured by dogs, and 25 were bitten or scratched by cats. Twenty-three accidents involved horses, 18 of these being falls. Seventeen children were bitten by squirrels, 14 by hamsters, six by rabbits, six by snakes, and 12 by other animals including a bat, a ferret and a groundhog. One young girl was said to have been bitten on the buttock by a catfish!

Ninety-eight children received insect bites severe enough to bring them to the emergency department, including 19 bee and 12 wasp stings. The fact that 498 children were injured by dogs would indicate that the "public image" of dogs is somewhat overdrawn. Parents and children should regard all animals with more suspicion.

#### *Violence by Other Persons (604)*

As to violence by other persons, 283 children were kicked or pushed or injured by fighting or wrestling. One hundred and forty were hit by rocks or stones. Sixty children were examined in emergency because of alleged sexual assault.

While we may regard injuries from fighting or wrestling as inevitable, the number of children hurt by stones or rocks and the large number of cases of alleged assault should have our concern.

#### *Burns (554)*

Among the more serious types of accidents were the 554 burns. The largest number (257) were caused by hot liquids. Thirty-five of these occurred in the vacation month of July. An additional 66 children were burned when they touched stoves, radiators or appliances. Over 18% of the children with burns were admitted as in-patients, and five did not recover. In addition to the burns from appliances, 10 children suffered electrical burns from extension cords, plugs, or light sockets. These burns are usually caused by the child's placing the live plug in his mouth. The result is painful

and disfiguring. Chemical burns of the skin and eyes include 58 from an assortment of 28 household substances including lime, lye, turpentine, lighter fluid, and liniment.

There were 34 children with sunburn severe enough to bring them to the emergency department. Almost all these cases occurred during a sudden heat wave in May, indicating the need for precautions in the early summer. Firecracker explosions caused 14 burns, of which five involved the eyes, and there were 38 other burns of various types which caused injury to the eyes. One of the five deaths from burns was that of a 3-year-old boy who suffered burns to 70% of his body as a result of a gasoline explosion in the basement of his home.

It would seem that the dangers of fire are well known if not well heeded, but the common danger of scalding is not realized, nor are the more unusual burns such as chemical and electrical ones.

#### *Accidents Involving Machinery (152)*

Accidents or injuries caused by machinery other than vehicles were suffered by 152 children. Eighty-four per cent, or 127, of the children injured by machinery had wringer injuries which are painful and often damaging. Of the remainder in this group seven children were injured by lawn mowers and seven by power saws. Fortunately, wringers are gradually being outmoded by spin-dryers, but wringers still constitute a major danger to the children in our homes.

#### *Self-inflicted Injuries (19)*

There was a measure of poetic justice in that most of the self-inflicted injuries were to children who injured their hands or feet by hitting or kicking someone else. Four children attempted suicide, fortunately not successfully. During January, February and March three girls, aged 12 or 13 years, attempted suicide by taking pills. In November one boy, a Children's Aid Society ward who had been in many foster homes, shot himself with a rifle. He was admitted to hospital, where he recovered.

#### *Unspecified as to Cause (543)*

In only 543 cases were the causes of accidents unavailable.

#### OTHER FINDINGS

More than half of the recorded accidents occurred after 4.00 p.m. From a 25% sampling the age distribution of the 17,141 cases seen during the year 1962 is presented in Table II.

Though The Hospital for Sick Children may not receive as large a proportion of teenagers as we do of other children, it is clear that the greatest danger from accidents in childhood is in the two and three year age group.

One hundred and sixty-four eye injuries were specified, largely from sharp or flying objects and

TABLE II.—AGE DISTRIBUTION OF CASES

Age	Per cent
Under six months.....	1
6 months to 1 year.....	3
1 to 1½ years.....	4
1½ to 2 years.....	6
2 and 3 years.....	24
4 and 5 years.....	17
6 and 7 years.....	13
8 and 9 years.....	10
10 and 11 years.....	10
12 and 13 years.....	9
14 years and over.....	3

from chemical and other burns. There were 56 injuries inside the mouth in addition to those caused by burns or poisons, largely through falling with a sharp object in the mouth. Twenty-three injuries to the ear occurred when sharp objects were inserted. In only 3% of all cases were we unable to ascertain the cause of the accident. This indicates the excellent co-operation of the emergency nurses in interrogating the parents, and the willingness of parents to give information.

A more detailed study was made of the 302 children injured in falls on or down stairs during the last six months of 1962. Hospital admission was necessary for 39 children or about 13%. Of these 39, there were seven under 1 year, eight between 1 and 2 years of age, five aged 2 years, nine aged 3 years, none aged 4 years, one aged 5 years, three aged 6 years, and six aged 8 or over. The danger of stairs for small children is all too apparent from these figures. The average stay of the 39 patients was 6.2 days and the range was from two to 26 days. Most had head injuries and one had a lacerated cornea so severe as to necessitate enucleation. Of the 263 less severe cases that were treated in Emergency but not admitted, 108 were lacerations, 53 were head injuries, and 40 were fractures, mostly of limbs.

In the same period, the last half of 1962, there were 130 children injured in falls from beds, 23 of them being severe enough to require admission. Of the admitted cases, 10 were under one year, seven were over 1 and under 2 years of age, three were from 2 to 4 years of age, and three were 6 or over. All of the six children 2 years or over were injured in falls from upper bunk beds and their injuries were quite severe.

During the months of July, August and September there were 30 children seen because of falls from trees. Eleven of the 30 were admitted for stays averaging 10.4 days. All of the children admitted were five years or over. Their injuries included five serious fractures of the skull, two other head injuries, a fractured eye socket with fragmentation of bone and resultant injury to an eye muscle, a back injury, a broken arm, and a severed artery. Several of these patients had other fractures. Of the 19 not admitted, 10 had fractures. Tree climbing appears to be a real hazard.

Regarding playground accidents, a review for July and August showed that falls from slides were the most serious accidents. Twenty-six children were so injured and seven had to be admitted, mostly with head injuries.

In November and December 1962 there were 54 hockey injuries and 60 skating injuries. One of the hockey players was admitted because of a hemorrhage into the eye. Like most other hockey injuries, this was caused by "high sticking". Three skaters were admitted, two with fractured elbows and one with a serious skull fracture. The remaining injuries to skaters were fractures or lacerations widely distributed as to site.

During the last six months of 1962 there were 73 wringer injuries, of which 39 occurred in the 2 to 4 year age group.

During one month, July 1962, there were 63 children treated for external burns. Fifteen, or 24% were admitted and two of these died, one who had second- and third-degree burns over 42% of her body due to a house fire, and one 13-month-old girl who had been playing in a bathtub. She was lying on her stomach when her 4-year-old brother turned on the hot water. She died on the day of admission. Most of the serious burns were from hot liquids, and many required extensive plastic surgery.

Internal burns are among the most serious of accidents and all must be admitted. There were 14 such lye or acid burns during the last six months of 1962, of which four were under 2 years, six were 2 years old, and four were ages 3, 4 and 5 years. Thirteen of the children had not swallowed the substance, so their burns were confined to the lips, tongue, throat and gums. Two children had burns on various parts of the body as well. The youngest involved an 8-month-old child who was found lying in bed with crystals of a drain cleaner spilled on him. In addition to the burns inside his mouth he had burns on his ear, cheek, wrists, elbows, eyelid, cornea, and the back of his head. The admissions ranged from two to 10 days.

The remaining child, a 16-month-old baby, had swallowed some diluted lye. He had some small burns inside the mouth in addition to a two-inch burn in the esophagus. The accident happened in July 1962 and he was in the hospital for six days at that time. In April 1963 the child was re-admitted because of difficulty in swallowing solid foods. This was due to scar formation. Dilatation was done twice during the first 11-day admission, again in September 1963, and a later examination under anesthesia in March 1964.

During the six-month period of July through December 1962 there were 68 children treated because of being hit by thrown stones or rocks. The five who were admitted included an eye injury necessitating enucleation, an eye injury for which enucleation was recommended, an eye injury which did not result in permanent damage, a fractured skull, and a fractured nose with displacement and

fragmentation of bone. Of the 63 children not admitted, 46 had lacerations of the scalp or face.

There were 30 female children brought to the Emergency Department during the last six months of 1962 because of alleged sexual assault. No particular pattern was noted concerning whether the attacker was previously known to the child. Some alleged attacks were unconfirmed. The most remarkable finding was that there was at least one child of each yearly age from 17 months to 14 years. One may well assume that some cases were unreported and the problem appears a serious one.

For April and May 1962 a study was made of all accidents affecting 6 year olds. There were 235 accidents to 231 children, four of them being repeaters during the two-month period under review. Two-thirds of the 231 children were boys and one-third girls. Two records were unavailable and the remaining 229 records were reviewed up to January 15, 1964. Counting accidents before and during April and May 1962 and up to January 15, 1964, these 229 6-year-old children had been treated at The Hospital for Sick Children for 429 accidents, an average of 1.87 accidents per child. Only 118 or 51.5% were treated for only one accident. Sixty-six children or 28.9% had two accidents, 25 or 11.0% had three accidents, eight or 3.5% had four accidents, five or 2.1% had five accidents, three children had six accidents, three had seven accidents, and one had eight accidents. The "champion" had no accidents treated here after April 1962, but in six years had been admitted, on two occasions, for a fall on his nose and because of swallowing gasoline. His other six accidents were a hit-and-run incident, another car accident resulting in a fractured arm, a dog bite, and a fall when pushed by

a friend. Sociological data for intensive study of the repeaters were not available, but it is abundantly evident that the accident-prone child is no myth.

The usefulness of a survey such as this depends to a great extent upon how well the findings become generally known. While the preventive value is difficult to measure, it is probably in direct proportion to the number of persons who are made aware of the findings. Within the hospital a display was set up based on these data and was shown to all our employees and auxiliary members, and a statement of the findings in an appropriate form was given to all members of the professional staff. Some of the staff members used this document in addresses to the Ontario Public Health Association, at numerous Home and School Association meetings, and as an aid in advising parents in their private practices. The display was also sent to the Ontario Safety League, which has exhibited it widely.

The report, the display, and the various public presentations of them received considerable press coverage, mostly in the Toronto area, but also in a national magazine. Personnel in the hospital field were reached by a brief report of this study published in the *Journal of the Canadian Hospital Association*. From the number of phone calls and written enquiries received, it can be said that there is considerable public and professional interest in this subject. Nevertheless, despite the extensive coverage obtained and the interest shown, the most important step is a presentation of the findings to the practising physician who is in the best position to advise parents concerning the prevention of accidents in childhood.

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#### PAGES OUT OF THE PAST: FROM THE JOURNAL OF FIFTY YEARS AGO

##### NOT IGNORANCE AND DELAY

Imagine that if those in charge of the various sanatoriums on this continent for the treatment of pulmonary tuberculosis were asked what has been the most outstanding fact of their medical work, the majority of them would say, The inability of the general practitioner to diagnose incipient, moderately advanced, and often far advanced tuberculosis, and the needlessness of much of the advanced disease that comes to their institutions for treatment.

The fact, indeed, is too often impressed upon us to be overlooked or forgotten; it is a fact which is brought afresh to our minds almost daily, and despite its recurring impact it never seems to dullen or make apathetic the sensibilities—it is too full of tragedy, too needless, to do that. It is a fact, too, which in view of the campaign that is now being waged against the disease, is thoroughly discouraging to those intimately associated in this work; a fact so outstanding, that one is almost forced to believe that it is not the indifference of the public, not the ignorance and delay of the patient in seeking advice, but the inability of practitioners to diagnose the disease in time, that is to-day the greatest clog in the forward movement to meet and cope with tuberculosis.

Many will doubt whether I am justified in using so freely

and insistently this word "fact", and will be inclined to attribute the failure of the practitioner to diagnose early tuberculosis of the lungs rather to the tardiness with which patients come for consultation than to poor diagnosis on the part of the physician. I am of opinion, from my experience first as a general practitioner and then wholly in tuberculosis work, that ability to interpret correctly the various normal and pathological lung sounds can come only from coaching at tuberculosis clinics, presided over by men specially trained in diagnosing pulmonary tuberculosis. This the great majority of practitioners have not had. Although most of them visit at some time in their careers various clinics, it is a rare thing for any of them to attend tuberculosis clinics, and in view of the inadequate training in diagnosing tuberculosis that is given in most of the medical schools to-day, and the fact that but a few of the text-books, and those only in the latest editions, are of any value in setting forth modern methods of diagnosing early tuberculosis, a difficult matter at the best, it is not surprising that there should come from sanatoriums everywhere the same counsel to practitioners: You are not diagnosing this disease in the stage when it could and should be diagnosed; and until you awaken to this fact the campaign against tuberculosis must fail.—A. F. Miller, *Canad. Med. Ass. J.*, 4: 793, 1914.