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ORIGINAL ARTICLES.

ETHER ANÆSTHESIA.

Read before the Kings County Medical Association, February 9, 1892.

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Mr. President and Members of the Kings County Medical Association.—It is provided by the by-laws of this Association that "at the February meeting each year the nine o'clock hour shall be devoted to an address from the president of the preceding year, upon the progress made during the year in that branch of the medical art or science in which he may have been specially interested." It is therefore in accordance with a free interpretation of the above by-law that a paper is presented for your consideration on the subject of ether anæsthesia, which may properly be classed among the medical arts; but, if I confined myself to the strict letter of the law, it is quite certain that I shall fail to present anything that can properly be considered to represent progress made during the year. It is not always certain at the close of a year what progress has really been made in medicine. Long and varied trials are necessary before theories are established and become the facts of medical science; and many a claim that starts out under favoring breezes is lost in transit or wrecked before reaching its destined haven. Cocaine and tuberculin are fresh and striking examples of the necessity for delay in pronouncing the final verdict on such claims, and illustrate what time will do to make or mar the reputation of men and methods. So, I venture to express in the following pages some thoughts that are the outcome of clinical experience extending over a number of years in the administration of ether as an anæsthetic; some of them have reached the voting age, and some are still minors. Many of them are firmly fixed in my mind and not lightly to be abandoned; others are offered with a certain amount of hesitancy; but all, I trust, subject to the changes that may be produced by larger experiences, either of my own or of others.

The subject of ether anæsthesia is chosen because it seems to furnish a topic of interest to every member of the profession and concerns the medical as well as the surgical practitioner, although not to the same extent, and in the presentation of the subject I do not desire to make a comparison between ether and other anæsthetics, interesting as that might be, nor to inflict on your patience statistical tables, however valuable they might be; but to present what my experience has forced upon me concerning the disagreeable symptoms and conditions, that may arise during its administration, the alleged dangers of ether anæsthesia and the methods that have been found useful as well as some that have been found useless in either preventing or relieving these dan-

gers or disagreeable conditions, and the paper will fall far short of accomplishing its object if it is considered simply as a formal address not to be discussed or commented upon. I trust it may, like any paper presented to the Association, elicit the expression of the experiences of the members of the Association, whether they are in harmony with those of the writer or at variance with them. The disagreeable symptoms that may arise during the administration of ether may be referred mostly to the stomach, the respiratory tract, the brain and nervous systems, and the heart; while the dangerous symptoms are traceable to the effect of the anæsthetic, either immediate or remote, on the brain, the heart, the stomach and the kidneys. I feel quite certain that with the proper preparation of the patient and an intelligent use of the anæsthetic, both the unpleasant symptoms and the real dangers of ether anæsthesia may be avoided in the large proportion of cases, and it will be quite exceptional to be annoyed by the former, or made anxious concerning the patient's recovery by the presence of the latter.

When proper precautions are not taken in the preparation of the patient, and especially when the anæsthetic is administered by one who is not familiar with its effects, it makes an onlooker pause in expressing the belief that anæsthesia is the greatest boon conferred on mankind during the present century; but on the other hand, when proper preliminary measures have been carried out and the administrator is one, who, by experience, has been taught the many tricks that ether plays, and still better how to avoid them, we may surely endorse every claim that is made for it, and rejoice in its gentle and potent aid.

Not a little importance should be attached, I think, to the preparation, where time admits, of the patient for a day before the operation to secure control of the quantity and variety of food the patient should take, to see that the bowels are moved by enema, or by more active measures where the tongue is loaded and the liver inactive. In private practice this is usually not difficult; but among dispensary patients, particularly those who, to save time, desire to enter the hospital on the day of the operation, it is especially important. The most careful directions in regard to food and medicine will oftentimes be entirely forgotten or ignored, and the penalty is paid in stomach irritation at times prolonged and distressing. It is always best in these cases, to insist on the patients entering the hospital in the evening of the day preceding the day of operation, and thus secure the carrying out of the directions given. A mild laxative, like fluid extract of Buckthorn, comp. licorice powder, etc., is sufficient except in cases where the bowels are to be kept quiet for several days after the operation, when a more active cathartic is needed. In cases of nervous or apprehensive patients a quieting dose of one of the bromides,

chloral, sulfonal somnal, etc., rarely opium, renders the nervous system more comfortably tolerant of the anæsthetic. An easily digested breakfast on the day of operation, and a bowl of broth two or three hours before the administration of the ether has seemed to me the best way to treat the stomach. I think all agree that the stomach should be empty at the time of the operation, but I am persuaded that a too prolonged fast is undesirable, and renders the stomach irritable rather than the reverse. In very nervous patients it seems to me well to make even the breakfast of the day of operation consist of fluid alone, a bowl of coffee or strong broth preferably; for the need of this unusual care in such cases finds striking illustration in the vomiting of solid food during anæsthesia that had been taken as much as twelve hours before the operation, and that had been retained in the stomach only partly, if at all, digested.

Beyond the measures above indicated my own experience has not encouraged me to go in the general preparation of the patient for avoiding the objections to ether. Many years ago I tried in a pretty large number of cases, moderately large doses of the bromides from an hour to twenty-four hours before the administration of the ether with the idea specially of preventing vomiting, but failed to find any beneficial results from their administration. Chloral also produced negative results in my hands. With these preliminary measures attended to, I have learned to feel that the most important thing I could do for my patient is to administer five or six minims of Magendie's solution of morphia with from $\frac{1}{16}$ to $\frac{1}{8}$ of a grain of sulphate of atropia hypodermically one hour before the ether is administered; a smaller dose of the opiate, of course, should be given to children, but the dose of atropia had better not be diminished. A larger dose of Magendie's solution, twelve to fifteen minims as has been recommended, is not only unnecessarily large, but dangerous. This use of morphia and atropia has many advantages; it quiets nervous excitement, it renders the patient more susceptible to the ether, it lessens the liability to vomiting, it saves ether, it controls the pain that the patient is liable to suffer after the operation, it counteracts the heart depression of the prolonged use of ether, it prevents in part free and exhausting perspiration and keeps the pharynx, larynx and bronchial mucous membrane from pouring out mucus to nauseate or choke the patient, and to overload his lungs and thus interfere immediately with the proper aeration of the blood, and to increase what some authorities consider one of the dangers of ether, namely, pneumonia. No originality, of course, is claimed for this use of morphia and atropia, for it is not infrequently employed; but it seems to me that insufficient emphasis has been laid on its value. Several years since a child about six of age had given to it by mistake a half grain instead of $\frac{1}{16}$ of a grain hypodermically before a slight operation on the leg—curettage carious bone, I believe. No morphia was used in this case. Not until an hour or two after the effects of the ether had passed off did the symptoms of belladonna poisoning manifest themselves. They were characteristic, were marked and passed off in six or eight hours. The child did not die. Making all allowance for the tolerance of belladonna in children, I am persuaded that the ether had to do with counteracting the effects of what might and probably would have been a lethal dose of the drug. Is it not

reasonable to think that atropia may, partly in its physiological action and partly in a way that we cannot fully explain, act in such a way as to diminish, if present, the unpleasant and dangerous effects of ether?

In regard to the use of alcoholic stimulants immediately preceding the administration of ether, it has always seemed to me to be contra-indicated. In the face of common practice I make this statement with some hesitation, and yet in persons who are not in the habit of using alcohol it has seemed to me to add to the risk of nausea and vomiting, and both in these cases and in users of alcohol to prolong the first or so-called stage of excitement. If anything is needed in addition to the morphia and atropia, I think we have it in the anæsthetic itself which, if not carried too far or used too long, is more efficient than alcohol in its cardiac stimulating effects. Indeed, there is not wanting authority for the belief that in the later stages of ether depression, alcohol only adds to the danger of cardiac weakness.

It is hardly necessary to state that artificial teeth, tobacco, pins, etc., should be removed from the mouth before the anæsthetic is given, and that the clothing about the chest should be loose enough to allow of the freest expansion of the chest in respiratory movements, that the ether should, as a rule, be administered with the patient out of the sight of the instruments to be used, and that the anæsthesia should be complete before the operation is begun; a primary incision before this stage is reached will have the effect of rousing the patient, as sudden fright will sober a drunken man, and the same effect will follow even moderate talking during the first stage of ether sleep. It is always wise to tell the patient of the primary unpleasant sensations he may experience, the, to many, disagreeable odor, the coughing, the sense of choking, the disposition to pull the inhaler from the mouth, the increased heart action, and also to assure him of his safety and that by exercising his self-control he can materially assist the surgeon and quietly pass into a state of comfortable sleep. If at the same time the patient is allowed to take the ether can or bottle between his hands and breathe the ether vapor for a moment or two before the inhaler is placed over the face he becomes accustomed to the odor and the effect on his breathing, and the ether produces a not inappreciable degree of pharyngeal anæsthesia. These preliminary points, that seem perhaps tiresome in the hearing, are mentioned as more or less important in bringing a patient under the influence of ether with the least risk to him and the least discomfort to himself and the anæsthetizer. It is hardly necessary to say that all these means may be and, in emergency cases and among children, often many of them must be neglected and still the patient is brought under the influence of the anæsthetic. The point under consideration is not whether unconsciousness can be produced with ether, nor how quickly, but how best as regards the patient's comfort and safety. As to the inhaler that shall be used, I think it makes very little difference whether a simple cone made of a towel or newspaper and a few pins or a more complicated and expensive apparatus is employed, provided an experienced hand and brain have control of it, and this experience we should always try to secure, and if the experienced anæsthetizer is at the same time the family physician, which is not infrequently the case, the surgeon and patient are both fortunate. The

numerous ether inhalers all have their advantages in economy of ether used, in allowing entrance of air in given and regular amounts, in excluding air, almost altogether, in cleanliness, in securing freedom from a sense of suffocation that is associated with the use of some of the various inhalers, in lowering the temperature of the ether vapor and thus rendering it less irritating, in rapidity of effect, etc.; but all of these, with the exception of modifying the temperature of the ether, may be secured with the cone. And how far the vapor is cooled in instruments devised for this purpose seems to me still a matter of doubt if we look for results based on actual thermometric records. The anæsthetic should be administered not too rapidly; ten minutes is a fair average allowance. To hurry it seems to me a mistake; it is unwise, therefore, to insist on the patients breathing rapidly, or to cough violently, etc., undoubtedly deep breathing that goes on easily or is secured when the patient is disposed to hold his breath, taking the cone entirely away from the face two or three times in the first minute or two, will enable the patient to get the air that he feels he needs, and will save him from the struggling, and sense of suffocation and cyanosis that are so frequent when the anæsthetic is administered too rapidly. Given in this way it has been the rare exception that I have not in private practice been able to put the patient to sleep without struggle and with the minimum amount of discomfort. When surgery of necessity prolongs many modern operations to two hours or more in their performance, we may well allow the patient four or five more minutes than are absolutely necessary for complete anæsthesia, to secure the added comfort in coming and perhaps staying under its influence. I am free to say, however, that in hospital practice, when many of the cases are either under the influence of alcohol at the time of the operation, or which is worse, are chronic abusers of alcohol, it is often difficult to secure a satisfactory anæsthesia without using a good deal of physical restraint, at times almost suggesting "crown-er's quest"—six on the body. But I can also state that even in these cases I have never had a patient whom I could not anæsthetize with ether. It would be an absurd claim to make that such cases do not exist; I am only stating my own experience, at the same time saying that I have seen ether abandoned when it appeared to me with proper care it might, and probably would have succeeded.

With the patient under the anæsthetic even with all the precautions mentioned, certain accidents may occur; the tongue may, by falling back, interfere with respiration; this may be overcome by turning the head to one side and pushing the lower jaw forward with the finger behind the angle of the jaw and thus avoid the removal of the inhaler which renders the patient liable to come partially out from the ether, and injuring the tongue, by applying forceps to it in order to draw it forward. The ease with which this difficulty is overcome indicates that the trouble is due to a paralysis rather than a spasm of the muscles. The evidence of complete anæsthesia for ordinary operations is the insensitiveness of the cornea to the touch of the finger; but when the parts about the perineum are the seat of operation a more profound anæsthesia must be produced. The anæsthetizer will always bear in mind the greater weight of ether vapor than air, and its inflammability, especially at night operations, or when the cautery is to be used.

Vomiting is one of the disagreeable effects of ether. If it is administered in the manner suggested in this paper it is in my experience exceptional to meet this symptom. It depends sometimes on too rapid anæsthesia, on our inability to prepare the patient for the operation, on alcoholism, acute or chronic, on motion of patient's body in applying dressings. It is best relieved by a little more ether, and firm pressure over the epigastrium has been found useful. When it occurs after the patient is regaining or has regained consciousness it is likely to be associated with or caused by other nervous manifestations such as laughing, crying, etc., and has been controlled best by hot water internally, small doses of cocaine, ice, champagne, and the many anti-emetics in use are more or less successful. By straining, vomiting may be productive of harm in disturbing the relation of wound flaps, and by vascular tension giving rise to hæmorrhage from vessels imperfectly blocked up. I can quote no statistic as to the exact per centage of cases in my own experience in which vomiting occurs, but I feel sure that ten per cent., taking all cases, would be a generous allowance. The other disagreeable conditions that arise during the etherization may be considered to a very large extent preventible symptoms, and dependent either on the patient's state or some fault in the administration of the anæsthetic.

Beside the symptoms already detailed that may arise, we have certain conditions in the lungs, heart and kidneys that necessitate the exercise of very unusual care in the employment of ether, although they have not led me in more than one case to abandon the use of ether for other anæsthetics. That case was one of high amputation of the thigh in a very weak boy with compound fracture of femur and prolonged suppuration. Nitrous oxide was used with entire success; but subsequent experience in similar cases has led me to feel that ether could have been safely used in this boy's case.

The patient is always entitled to a careful examination of the lungs, heart and kidneys, before the use of ether is decided upon, and if it is employed when these organs are diseased, its action should be most carefully watched, especial attention being directed to the avoidance of venous engorgement, so often produced in the early stage of anæsthesia. I have been obliged to employ ether in cases of old persons with emphysema and with chronic bronchitis, they having taken the ether moderately, fifteen or twenty minutes being consumed sometimes before the necessary effect has been produced. In a few cases of phthisis in the early stage I have employed ether without bad results, and when these cases are sent purposely to breathe the cold winter air of some of our consumption cures, and do so with benefit, we may hesitate to believe that the temperature of ether vapor in itself is responsible for inflammatory troubles that develop in the lung, in the small number of cases where these results follow the use of the anæsthetic. Surgical pneumonia is a thing to be dreaded, but more exact experience is desirable in reaching a conclusion as to the relative importance of the anæsthetic and the operation itself in producing the inflammatory trouble; and the traumatism present in many cases where no operation is performed and no ether given, must be credited with bearing a causal relation to the lung inflammation. Cases of fracture of the larger bones in elderly people furnish illustrations of pneumonia due in some

way to the patient's original injury. And furthermore, if the anæsthetic is to be made responsible for a pneumonia following its use, the inflammation ought to follow promptly the use of the anæsthetic, and not be attributed to it when the patient is for two or three days free from any pulmonary symptoms.

In considering the cardiac conditions that call for unusual care in giving ether, it has seemed to me that the right heart needs especial watching, that it does not become overloaded. It has been a common experience to have a weak pulse grow fuller, and in a few instances an irregular one to become regular, under the inhalation of ether vapor, and to have thus a feeble heart benefited by its use. I never have had occasion to use ether in a case of aortic aneurism, but in aneurisms in other parts of the body, abdominal, carotid and popliteal, it has not produced any increased tension that has been appreciable to the rough test of the hand. It is quite easy to believe that with the sac worn very thin, it might be the exciting cause of a rupture, with its rapidly disastrous results.

We are more apt to ignore the kidneys than the heart and lungs in reference to the propriety of administering ether; but their condition is not less important, perhaps. Some surgeons even are on record as stating that ether as an anæsthetic should not be used in cases of even suspected acute or chronic nephritis, and that ether is contraindicated in all affections that impair the integrity of the renal function. As I have already stated, the urine should be examined not only for albumin, but a *complete* examination made of it, including the test for urea. In one case of pregnancy operated upon by me, with slight amount of albumin present, an operation lasting half an hour was followed by no untoward symptoms. In several cases where the renal symptoms indicated the presence of a cirrhotic kidney, no bad effects followed the use of the ether. Beyond this my experience does not go. I never have had occasion to operate upon a patient with badly crippled renal action, and I will be pardoned, therefore, if I quote somewhat freely from a paper read before the New York Surgical Society by Dr. R. F. Weir, January 8, 1890, entitled "Does Ether Anæsthesia injuriously Affect the Kidneys?" In support of an affirmative answer to this question may be cited the opinion expressed by Dr. D. A. Emmet, that "to the effects of the anæsthetic I attribute the chief danger attending the operation (cystotomy) in the advanced stages of the disease, while, on account of the irritability of the bladder, its use is indispensable. As the kidneys are barely able to perform their function sufficiently well to preserve life, the balance is easily lost in the attempt at elimination, and death from uræmia rapidly takes place."

A case is reported of amputation of arm, where heart failure showed itself after a few inhalations of ether, and operation finished without anæsthetic. Fever and delirium in a few days; death in two weeks without any ante-mortem urinary examination. Acute fatty degeneration of kidneys found post-mortem. Query, Was not this ether effects? Dr. Weir's comment is that the cause of death was septicæmia, and not ether.

Another case is reported of cataract operation in a child under ether. Convulsions two hours after operation, coma and death two hours later. After death intense congestion and parenchymatous and fatty degeneration of kidneys found.

Some kidney changes found post-mortem in another cataract operation under ether. Albumin not discovered until seventeen days afterward, with granular and fatty casts. Death on eighteenth day. Two post-mortems reported by the late Wesley M. Carpenter, of extensive kidney lesions, one case of recto-vaginal fistula, death on table just before completion of operation, heart not examined; the other, character of operation not stated, death eight hours afterward, patient going to water-closet, breathing stertorously, where, beside kidney lesion, marked mitral disease and decided atrophy of right ventricle were found.

Another case with normal kidneys had uterus curetted, no bad results; a year later, with previous evidence of slight catarrhal nephritis, curetting repeated under ether. Collapse in twenty-four hours, scanty urine, albumin abundant, hyaline, bloody and granular casts in abundance. Temperature not given, and the renal trouble attributed in good part by the writer to septic processes.

On the other hand, as favoring a negative reply to the question that forms the title of Dr. Weir's paper, are the following conclusions of Dr. Feutin, of Berne, based upon his experiments on animals and upon 150 cases wherein ether was given, the time noted, and the amount consumed:

1. That ether has no perceptible effect upon the healthy kidneys of animals—who, moreover, are more susceptible than mankind to its influence.
2. That it is not dangerous in persons whose kidneys are slightly diseased.
3. That subsequent disturbances of circulation in the kidney, when met with, are very transitory and rapidly disappear.
4. That the presence of abnormal urinary ingredients is not a positive counter-indication for the use of ether.

Added to this is Dr. Weir's own experience as quoted in part below:

"In thirty-four cases where albumin was not found prior to the performance of an operation which excluded the abdominal or genito-urinary regions, in nine there was, after the operation, a trace of albumin to be found which was of a transitory nature, and in twenty-five there was no change whatever, chemically or microscopically, in the urinary secretion.

"In further analyzing my cases, I find that in five patients evidences of a diseased kidney existed prior to the operation, but the albumin was not increased afterward in three of these, but was increased to a slight extent in two, without the development of unpleasant symptoms. In four of the patients, in whom no albumin existed previous to the operation, and in whom it was found in small amount after the operation, there was associated with this symptom a few blood cells, renal epithelium, a few hyaline casts, and an occasional leucocyte. These were also of but short duration.

"The whole outcome of this limited series of observations is not to belittle the risks that patients with much damaged kidneys run in the course of an operation, but rather to direct more clearly our attention to efforts to neutralize these dangers. While I myself do not know of any efficient means of preparing a damaged kidney to undertake the greater work that may be thrown upon it by a febrile action in the system, yet in such instances I do take greater

care to avoid the influences of exposure and cold, and am more particular to direct that ether should be so given as to avoid the venous congestions that are so frequently observed during the careless administration of this anæsthetic. I am unwilling in these cases to prolong the abstention from fluids, and, when so forced to do under the irritation of the stomach, resort early and often to large hot-water injections into the rectum, and above all—and this has been the aim of this discursive paper—I feel that attention should be stringently directed to the most careful carrying out of the antiseptic treatment. And in many instances of this class of patients, rather than run the risk that often occurs from defective drainage (and I believe that drainage is more often carried out by the outside of a tube than by its quickly choked-up lumen, and is therefore many times imperfectly carried out), I prefer to let such wounds be packed with an antiseptic gauze and allowed, where possible, to heal up from the bottom.

"In the few instances that I can recall of marked renal complications following the administration of ether, the operation has been performed in portions of the body where sepsis is most likely to occur and where it is most difficult to guard against it—to wit, the rectum and the mouth."

A single thought may be added, in conclusion, in regard to the mortality from ether. One of the strongest points in favor of ether as an anæsthetic, has been its safety. Not that it may not kill when used carelessly, or even with the greatest care; but, making all due allowance for the possible danger of the anæsthetic state however produced, ether has still justly claimed for it a large measure of safety. One death in 23,204 cases is a very low mortality, and this ratio represents, as accurately as may be by figures alone, the death-rate from ether. It has never been my bad fortune to lose a patient from the effects of ether. And yet this unqualified statement should not be made. Those who advocate the use of ether as an anæsthetic maintain that the deaths due to ether do not, as a rule, occur with the patient on the operating table, but that the pneumonia or bronchitis, or renal disturbance that finally carries the patient off, may be traced back to the anæsthetic. But inasmuch as these same visceral changes are produced by septic influences connected with the operations performed under ether, there will still remain a doubt in the minds of all advocates of ether, as to the relative part played by the ether and the operation in the fatal result. And a profitable study of statistics relating to alleged ether deaths might put the profession in a better position to defend or refute the charge that ether is not so safe an anæsthetic as most surgeons are disposed to believe.

SOCIAL SCIENCE PROBLEMS OF INEBRIETY.

Read before the Social Science Association, Saratoga, N. Y.

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Notwithstanding all the advances of civilization and intelligence, and the increasing temperance agitation, and effort, the drink evil, or inebriety, is one of the most threatening ominous perils to all social progress and development of to-day.

Some idea of its extent may be obtained from the following statistics. In 1890 over half a million persons were arrested in this country charged with be-

ing drunk and disorderly, crazed from the effects of alcohol. Nearly twenty per cent. had committed crime of petty character while under the influence of spirits.

These facts furnish some approximate estimate of the extent of inebriety in this country. It is reasonable to infer that if half a million inebriates have come under police surveillance in one year, at least a third of this number using alcohol to excess, have escaped legal notice.

The statement that there are fully a million persons in this country who are, continuously or at intervals, using alcohol and opium to excess and poisoning themselves is not an extravagant or improbable one.

Of course the mortality from this, both directly and indirectly, is excessive, and the oft repeated assertion of sixty and a hundred thousand deaths a year from alcohol, is after all, only a minimum statement.

Practically this vast army of inebriates are withdrawn from the ranks of active workers and producers, and become burdens and obstacles to all healthy living and progressive development.

Yet literally this army and its excessive fatality would be insignificant compared with the injuries and losses which follow.

These cases are always centers of pauperism both to themselves and family. Often they form centers of criminality, and in all cases cultivate the most unsanitary conditions of life and surroundings. They are actually *foci* from which spring all forms of degenerations, and bad influences, and streams of heredity that are terrible in their power in the next generation. If this drink evil could be limited to the victim, the presence of a million inebriates with a mortality of forty or fifty per cent. would be less terrible.

Literally, every inebriate, if married, pauperizes his family in some degree, entails on his children tides of degeneration, periling their future physically, mentally and morally. If a single man, he cultivates conditions of degeneration which affect all who come in contact with him. He encourages unsanitary and psychological states that are the opposite of healthy growth and living.

If he occupies prominence in society and has influence and money, the insanity of his inebriety antagonizes everything that is rational and sanitary.

The great question to-day is not so much the cure of this army, or the checking of its mortality, but of prevention, from a knowledge and removal of the causes and conditions which favor its growth and development.

Inebriety in a general sense is a progressive march of dissolution, with constant hints of the possibility of halts and checks, where the march can be stayed, and the causes changed.

Scientific observation of the inebriate made two thousand years ago, and the more accurate studies the last quarter of a century all support one broad conclusion: that inebriety is a disease, with a distinct and complex causation; that this disease follows a regular line of march from the beginning through and development on to decline and extinction. Its magnitude, uniformity and fatality, furnish abundant proof of distinct disease and distinct causation, clearly traceable from accurate study. This great drink problem in 1892 is practically this: Thousands