for an adult of one-tenth to one-half of a grain mixed with sugar of milk, taken hourly, or every second or third hour as the case may require. Four to six powders daily is usually sufficient; a child should take one-tenth or one-twentieth of a grain.

It may not be amiss to mention that, in employing these agents in baths, porcelain or wooden vessels must be used, as the sulphides attack and discolour most metals. These baths emit an offensive and powerful stench.

CHLORINE GAS.
CHLORINE WATER.
CHLORINATED SODA } **and their solutions.**
CHLORINATED LIME }

These substances are used as deodorizers, disinfectants, and antiseptics.

Whatever power they possess in these respects, is due either to chlorine or to hypochlorous acid.

Chlorine gas possessing very strong chemical affinities, acts probably by seizing with avidity the hydrogen from many organic and inorganic substances, and thus breaks up their composition.

Hypochlorous acid, which is given off abundantly by the two last-mentioned members of the group, is an active oxidizing agent. It yields up its oxygen readily, and so destroys many substances: at the same time chlorine gas is set free, which again acts in the way just described.

These substances are thus deodorizers, destroying the ammonias, sulphuretted hydrogen, and sulphides of ammonium, on which the disagreeable odours of sick rooms depend.

Chlorine, from its gaseous state, is admirably suited as a deodorizer, as it penetrates every cranny of the room, searching out and destroying noxious and offensive gases.

While these substances may be conveniently and profitably used as deodorizers, it must always be borne in mind that it is preferable to prevent bad smells by free ventilation, and that chlorine gas itself has an odour very disagreeable to most people. If these deodorizers are often required in a sick room, it is a sure sign that ventilation is defective, and probably that the nurse is careless.

These substances are employed as disinfectants, but the evidence in favour of their possessing such a property, although very generally held to be sufficient, is inconclusive.

When treated with these substances, some infecting matters, it is true, lose their power to propagate disease; but it is impossible to subject either persons or things to such destructive action as was found to be required in these experiments. It is not, however, the less desirable to fumigate rooms lately occupied by sick people, as the process can do no harm, and is probably highly salutary.

To disinfect unoccupied rooms, the air must be very strongly impregnated with chlorine. M. Regnault recommends the following plan:—Sew one pound of chloride of lime loosely in a strong canvas bag and put it into a mixture composed of a pint and a half of commercial hydrochloric acid with four and a half pints of water. The room is then closed and the chimney outlet blocked. After twenty-four hours the room should be freely ventilated for forty-eight hours.

Besides destroying many offensive gases, these substances prevent decomposition; hence they are useful as washes or injections to prevent the decomposition of the pus of sores or cavities of the body. Sloughing, foul-smelling sores should be washed with solutions of these or similarly acting substances. Chlorine compounds, being slightly stimulating, improve the condition of indolent sores. After an operation, it sometimes happens that hollows are left, in which pus collects and putrefies. The fetid gas and putrid pus becoming absorbed, poison the system. This may be avoided by washing out the cavities several times daily with a weak chlorine

solution. In puerperal peritonitis, or at any time when the uterus contains decomposing matters, the vagina must be thoroughly and frequently washed out, and it is desirable to add some deodorizing and antiseptic substance to the injected water.

In empyema, after the chest is opened spontaneously or artificially, the putrefaction of the contained pus must be prevented by washing out the cavity with antiseptic substances. In sloughing of the throat, as of scarlet fever or diphtheria, and in salivation and ulceration of the mouth, the smell and putrefaction are removed by washing with similar solutions.

A strong solution of chlorinated soda applied to the throat in diphtheria has been highly recommended.

The deodorizing and antiseptic substances chiefly in use besides the members of this group, are iodine, permanganate of potash, and carbolic acid. Solutions of permanganate of potash, unless unnecessarily strong, are bland and unirritating; while the chlorine and carbolic acid solutions are stimulating, and even irritating. Carbolic acid in some respects is inferior to the members of this group. Both arrest or prevent putrefactions, but carbolic acid manifests no power to destroy offensive gases.

IODINE.

Iodine possesses powerful chemical affinities, and combines energetically with many organic and inorganic substances. It is volatile, and readily penetrates the animal textures.

It is applied to the skin for a variety of purposes. A strong solution, as the liniment, is frequently used as a rubefacient and counter-irritant. It produces at first a sensation of heat and burning, which may increase to an unendurable extent. The inflammation it excites separates the cuticle to a greater or less extent from the dermis. So slight may this be that in a few days mere desquamation results; but if the liniment is

a strong one, even a blister, containing serum with much fibrin, is rapidly produced, leaving sometimes a permanent scar—a misadventure which it need hardly be said should be carefully avoided.

The skin can generally bear two lightly painted coats of the pharmacopœia liniment, unless a previous application has rendered the skin thin and delicate, when one coat, lightly applied, is all that can be endured. If, as sometimes happens, the application causes much pain, the iodine should be washed off with spirits of wine, gin, whiskey, or eau de Cologne, or, best of all, a solution of iodide of potassium, and the pain subdued by the application of a poultice. Iodine liniment will often excite a crop of itching papules at and around the painted spot.

The liniment applied to the chest as a counter-irritant in chronic pleurisy is used to promote the absorption of the fluid accumulated in the pleura. Painted under the clavicles in the chronic forms of phthisis, it is of great service to allay harassing cough, and to check secretion from the bronchial tubes and cavities of the lungs. Painted over the front and back of the chest it often affords relief in chronic bronchial catarrh by easing the cough and lessening expectoration. It may also be painted on any part of the chest affected with pleurodynic pains, although a mustard poultice is preferable, as it can be re-applied should the pain return. The iodine, however, may succeed where the mustard poultice fails. Iodine is painted around joints affected with chronic rheumatism or chronic gout, or with chronic synovitis. Like blisters, it eases the pain, and often removes the fluid distending the cavity of the joint; like blisters, too, it often causes, for a few days, increased distension of the joint, its good effects not becoming apparent till later. This increase in the swelling may be regarded as an indication of the success of the application. The liniment is useful when painted on the skin over a bronchocele. It should be applied as often as the state of the skin will permit, till the tumour disappears. It can seldom be borne oftener than once a week. The liniment or tincture

is recommended as a local application to lupus. It must be painted, not only on the edges of the sore, but also over the tissues around it. Thus applied, it is said to arrest the spreading of the disease. In the form of ointment its applications are manifold. It is of the greatest benefit in chilblains, if well rubbed over the affected part before the skin is broken. The tincture lightly painted over the part is often used for chilblains, but the ointment is far more efficacious, curing the chilblains in one or two days if the skin is unbroken.

The ointment is often useful in removing some of the non-inflammatory pains of the chest. These, however, not being always of the same nature, discrimination must be exercised in the employment of this ointment. When the pain is situated in the muscles (myalgia), and these are tender on pressure, while the skin may be pinched without pain, this ointment is indicated. But if the tenderness is situated in the skin (pleurodynia), belladonna is to be preferred. The author believes Dr. Hare first pointed out this distinction, and it is one which holds true, but not without exceptions.

The ointment, tincture, and liniment of iodine are used for the same purposes; but it must be recollected that the ointment and tincture are much milder preparations, and will produce, even after several applications, but a small amount of desquamation. When a strong irritant action is needed, the liniment must be employed.

The tincture or the ointment is applied often to the skin, over indurated swollen glands, or over parts thickened by inflammation, with the intention of removing the diseased products; when painted over scrofulous glands or glands sub-acutely inflamed, care must be taken, or sometimes the applications increase the inflammation and favour suppuration. Iodine mixed with light oil of wood tar in the proportion of two drachms of iodine to an ounce of oil of wood tar, has been recommended by Mr. Coster, as an efficient application in tinea tonsurans. This application usually produces no pain, and without doubt prevents the extension of this troublesome disease.

The liniment, ointment, or tincture, will, by its irritant action, remove herpes circinnatus. One application of the liniment is enough, but the ointment or tincture must be applied once or twice daily.

The spreading of erysipelas, it is stated, may be arrested by painting the affected and circumjacent skin with a solution of iodine.

Mr. Jordan and Dr. T. K. Spender speak highly of the local application of the liniment in the neighbourhood of local inflammation. If applied so as to produce vesication around a bubo, an abscess, or a carbuncle, it considerably reduces inflammation.

In hydrocele, iodine in solution is often injected into the serous cavity surrounding the testicle. The serous fluid is first drawn off, then a solution of iodine is injected into the cavity, which, exciting in the parts over which it flows, adhesive inflammation, the contiguous parts of the sac become united, and the further effusion of serum is rendered impossible.

Iodine solution is injected into joints affected with white swelling, into the cavity of the pleura in empyema, into ovarian tumours after tapping, and into large abscesses, after they have been evacuated. Ten ounces of the tincture, and even more, may be injected into an ovarian sac. The results of the cases thus treated are most satisfactory, and if the testimony of its advocates is not overdrawn, it is surprising that this treatment is not more widely employed. In the treatment of white swellings, it is said to produce no disagreeable symptoms; and unless there is caries or necrosis of the bones, or swelling of the surrounding parts, this treatment is generally favourable.

In chronic pleurisy, after the side has been evacuated, iodine injections remove the great fetor often present, arising from the decomposition of pus in the pleural sac, and at the same time diminish the secretion from its walls. The injection must be at first weak, say four or five grains of iodine and iodide of potassium to a pint of water. When the struc-

tures have become accustomed to this injection, a stronger solution may be employed. Although no doubt such treatment is often successful, still it must be adopted with the greatest caution, otherwise inflammation, with high fever, may set in, and prove fatal to the patient.

Milder injections containing permanganate of potash, or a small quantity of creosote, are sometimes all that is required; and if these succeed in removing the fetor from the pus, the more powerful application need not be employed. Since the wasting, the loss of appetite, and depression in cases like these is mainly traceable to the absorption of poisonous gases and putrid fluids, it is of the highest importance to keep the sac free from foul gases and decomposing pus.

Iodine solutions injected into the cavities of large abscesses after their contents have been discharged, often prove very serviceable. The tincture itself may be freely used; the cavity of the abscess should subsequently be kept clean and sweet by frequent washings with a weak solution of permanganate of potash. Iliac and lumbar abscess may be treated in this way. The tincture of iodine may often be used as an inhalation, with signal benefit in the four following instances.

In the chronic forms of phthisis (fibroid lung), when the expectoration is abundant, and the cough troublesome, an inhalation used night and morning will generally lessen the expectoration, and allay the cough.

Children, six to ten years of age, after measles, or independently of it, on exposure to cold, are seized with hoarseness, a hoarse hollow cough, and some wheezing at the chest. The parts affected appear to be the larynx, trachea, and larger bronchial tubes. This affection often proves very obstinate, is apt to return, and to continue a considerable time; but iodine inhalations will generally cure it.

Iodine inhalations have proved of great service in some epidemics of diphtheria. Dr. Waring-Curran recommends the following mixture:—4 grains of iodine, 4 grains of iodide of potassium, 4 drachms of alcohol, and 4 ounces of water.

A teaspoonful of this should be added to boiling water, and the steam inhaled. The water should be kept hot by a spiritlamp. As the patient becomes accustomed to the iodine, the quantity of the solution may be increased till half an ounce of it is employed at each inhalation. It should be repeated many times a day, and each inhalation continued from eight to twelve minutes.

Patients of various ages are greatly troubled, often for many years, with daily attacks, lasting, it may be several hours, of sneezing, running at the nose of a watery fluid, weeping of the eyes, and severe frontal headache. This affection is often removed at once by iodine inhalations.

The author adopts the following simple, handy, and cleanly plan of inhalation:—A jug, capable of holding about two pints of water, is well heated by rinsing with boiling water; then partially filled with boiling water, into which twenty or thirty drops of the tincture of iodine are poured; the patient is then directed to put his face over the mouth of the jug, and to breathe the iodized steam; both the jug and the head of the patient being covered with a towel to prevent the escape of the steam. This inhalation should be used night and morning, for five minutes, or a little longer. Too much iodine will occasionally produce a sensation of soreness in the chest and throat, sometimes with redness of the conjunctiva, running from the nose, and pain in the head.

The inhalation is sometimes employed in chronic bronchitis; but the author thinks without much advantage.

The tincture may be employed with benefit to remove tartar from the teeth; and to stimulate the gums when these are beginning to recede, leaving the teeth exposed to become decayed. It should be painted over the gums close to the teeth.

An iodine gargle, made with two or four drachms of the tincture to eight ounces of water, has been recommended to allay mercurial salivation; and the tincture of iodine is applied to sores of the throat, syphilitic and simple.

Iodine taken into the stomach in undue quantity, irritates

and excites inflammation in the delicate structures of this part, inducing pain at the epigastrium, vomiting, diarrhœa, sometimes much collapse, and even death. It should be given soon after a meal, when the mucous membrane is protected by the food contained in the stomach.

When this substance reaches the stomach or intestines, and certainly when it enters the blood, theory would suggest that the iodine would become converted into either an iodide of potassium, or, more probably, of sodium, and that thenceforth, in its career through the body, it would manifest the effects of an iodide. Practically there is much to confirm this view, as the action of iodine is very generally admitted to be identical with that of the iodides on the distant organs of the body. Yet some practical authorities state that in chronic rheumatic arthritis the tincture of iodine is serviceable when iodide of potassium fails. It is certainly difficult to understand how this should be.

Iodine may be used as a deodorizer and disinfectant in contagious diseases by simply suspending a chip-box or saucer containing a few grains over the patient's head.

IODIDE OF POTASSIUM.

This being an extremely soluble salt, and endowed with a very high diffusion-power, it finds a ready entrance into the blood, and as speedy an exit from it with the secretions of the body.

As an external application, it formerly enjoyed more favour than it at present holds. As an ointment, it is often applied to the skin over enlarged glands, or parts thickened with inflammatory products, with the view of restoring the tissues to their natural state. In conjunction with the internal use of iodide of potassium, the ointment, applied to obstinate nodes, hastens their resolution, and it is especially useful when this salt disagrees, causing nausea, diarrhœa, or

great prostration. The ointment is sometimes applied for the itch. The ointment of this salt, or of iodine, is often applied in bronchocele.

According to most authorities, the iodide, probably after its absorption into the blood, produces decided changes in the mucous membrane of the mouth. It causes redness and injection of the lining of the cheek, the throat, soft palate, and of the tongue, and an increased growth and separation of the epithelium covering these parts, and an augmented flow of saliva. These phenomena, however, are certainly often absent after large doses of the medicine, and even in severe iodism. It has a saltish taste.

A large dose proves an irritant to the stomach, and disorders digestion. Some are much more prone to be thus affected than others; and so marked is this difference that even minute medicinal doses sometimes irritate the stomach.

Like the chloride of sodium and chloride of ammonium, this salt increases the production of mucus from the stomach and intestines, as well as from the mucous membrane of other parts of the body. When such a result is desired, we resort to the chloride of ammonium in preference to this salt.

From its great diffusion-power it passes with great rapidity from the stomach into the blood, and very speedily appears in the urine. Only a small proportion, therefore, passes into the intestines, and generally it purges only when taken in very large doses; but it is never employed for this purpose.

Some maintain that when iodide of potassium comes in contact with chloride of sodium, either in the stomach or blood, it changes its base, becoming iodide of sodium. At present we know but little what physical or chemical changes it produces in the blood; nor know we much regarding the organs to which it is carried.

If its administration is continued for a long period, or if the patient manifest great susceptibility to its action, we produce a condition termed iodism.