recurs rapidly, a suitable needle may be inserted and connected to a rubber tube attached to a simple under-water drainage bottle as used for closed drainage of empyemata (Fig. 3). This will afford great relief, but has the disadvan-

FIG. 3.—Simple under-water drainage bottle.

tage that, as air is expelled during cough, it may result in the development of a low intrapleural pressure, with too rapid re-expansion of the lung, giving the pleuro-bronchial fistula no chance to heal. It may be more satisfactory, in a patient who is not distressed by an intrapleural pressure equal to atmospheric, to leave a needle *in situ* open to the air, preferably through a loose cotton-wool filter. If, however, the patient is distressed with an atmospheric intrapleural pressure the arrangement shown in Fig. 4 may be

FIG. 4.—Apparatus for under-water drainage of tension pneumothorax, with safety-valve.

used. In this, bottle B is added to the simple under-water drainage bottle A to act as a safety-valve, letting air into the system whenever the pressure gets below a level equal to that number of centimetres of water below atmospheric by which the tube C projects below the surface of the water in bottle B. This is of course adjustable to whatever level is required for relief of the patient's discomfort. The rather more complicated apparatus described by Marriott and Foster-Carter (1940) may be used for the same purpose.

In general, in the treatment of valvular pneumothorax as little air as possible should be withdrawn or the pressure maintained as near atmospheric as it can be, in order to keep the lung as firmly collapsed as is consistent with the patient's comfort, since only thus has the pleuro-bronchial opening the best chance of healing. In valvular pneumothorax due to wounds surgical intervention will often be indicated; but the measures outlined above may be necessary life-saving preliminary steps.

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HEALTH INDICES FOR GREATER LONDON AND NEW YORK, 1931-40

BY

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In a leading article (*Journal*, February 8, p. 201) dealing with the provisional notification and death rates from certain causes in the city of New York for the year 1940 regret was expressed that no recent death rates were available for London with which these could be compared. The February issue of the Quarterly Bulletin of the Health Department of New York City contained the death rates in each year from 1931 to 1940, at appropriate ages, from diphtheria, scarlet fever, measles, whooping-cough, tuberculosis, pneumonia, appendicitis, suicide, homicide, accidents, and some other causes. Greater London and New York are at present not far apart in their total populations, and it is of interest from a public health standpoint to compare the changes which have occurred in the death rates from these causes in the two cities since 1931. In such a comparison it must be remembered that while the New York figures do not include deaths of residents which occurred outside the city and do not exclude those of non-residents which occurred within the city, the Greater London rates have been corrected for inward and outward transfers and represent the total mortality suffered by residents. The effect of this can be illustrated from the following example. In 1940, 227 deaths from diphtheria, scarlet fever, measles, and whooping-cough were registered in Greater London, but of these only 104 were of residents; in addition 163 deaths of Greater London residents from these causes were registered in other administrative areas of England and Wales, making a total of 267 residents, compared with 227 registrations. If the same conditions hold for New York this would account for an apparent excess of 18% in the combined rate for these diseases in Greater London, but if a larger proportion of New York's infectious disease hospitals lie outside the city's boundaries a still greater apparent excess might result. The same considerations apply to tuberculosis, from which cause a large proportion of deaths of town dwellers occur in institutions situated in the country, and unless these are transferred to the towns of residence the death rates of the latter are fictitiously low. In New York it has been ascertained that the addition of deaths from tuberculosis of residents occurring outside the city would increase the rates by about 10%. Causes such as pneumonia and appendicitis are not likely to be affected to the same extent, but the general death rate of Greater London is raised appreciably by the process of allocation of all deaths to the place of residence of the deceased. In the December quarter of 1939, for example, 19,309 deaths from all causes were registered in the area, 6,360 of these being of non-residents, while 7,512 residents died elsewhere; the corrected death rate was consequently 6% in excess of the uncorrected rate.

Since it is uncertain to what extent the New York death rates are understated owing to this absence of correction, the best method of comparing the progress made in the two cities since 1931 is to study the changes in the *ratio* of the Greater London death rate to that of New York. Changes since 1931 in the distribution of hospital cases in and around New York are unlikely to have seriously affected the ratio, and if it has consistently increased the conclusion may be drawn that progress in reducing mortality from the disease in question in Greater London has not kept pace with that in New York, and vice versa.

For diphtheria the London/New York ratio in 1931-4 ranged from 2.0 to 6.5, but in 1937-40 it ranged from 6.0 to 8.6, for whilst New York has reduced the toll of this disease by more than 85% since 1932, Greater London's rate has fallen by little more than half. For scarlet fever, however, the ratio has not changed consistently, the average death rate in Greater London having fallen from 66 in 1931-4 to 15 in 1937-40 and in New York from 49 to 12—that is to say, by more than 75% in each city.

Diphtheria and Scarlet Fever. Death Rates per Million Children Under 15 Years of Age

Year	Diphtheria			Scarlet Fever		
	Gr. London	New York	Ratio	Gr. London	New York	Ratio
1931	242	110	2.2	58	50	1.2
1932	251	124	2.0	66	79	0.8
1933	330	51	6.5	67	35	1.9
1934	450	61	2.4	75	31	2.4
1935	293	40	7.3	27	45	0.6
1936	224	21	10.7	36	38	0.9
1937	216	36	6.0	29	19	1.5
1938	219	36	6.1	19	11	1.7
1939	116	16	7.2	7	10	0.7
1940	121*	14	8.6	7*	9	0.8

* Provisional rates.

For measles the annual London/New York ratio has fluctuated greatly owing to epidemics occurring in different years, but when the average rates in 1931-4 and 1937-40 are compared it is evident that a parallel decline in mortality of children under 5 has occurred in the two cities, the London rate remaining at 5 times that of New York. For whooping-cough a slight fall has taken place in the ratio in recent years.

Measles and Whooping-cough. Death Rates per Million Children Under 5 Years of Age

Year	Measles			Whooping-cough		
	Gr. London	New York	Ratio*	Gr. London	New York	Ratio*
1931	221	252	5.1	817	403	2.0
1932	1,871	112		904	281	3.2
1933	187	428		880	257	3.4
1934	2,003	52		731	221	3.3
1935	56	228	3.8	444	321	2.8
1936	1,505	185		757	107	
1937	75	61	4.9	634	106	2.7
1938	579	93		285	233	
1939	11	2		399	87	2.4
1940	132+	7		70+	108	

* Ratio of average annual rates + Provisional.

Greater London's tuberculosis death rate in 1931 was 1.27 times that recorded for New York, but as it is estimated that the latter would be increased 10% by inclusion of deaths of New York residents occurring away from the city, the real excess in the crude death rate must have been about 15%. The ratio declined from 1.28 in 1933 to 1.10 in 1936, indicating a more rapid improvement in London in that period and bringing the crude death rate to equality with that of New York. Since 1936, however, the ratio has risen again year by year to 1.23 in 1939, this being due to an accelerated decline in New York in recent years combined with a setback in London in 1939.

Tuberculosis and Pneumonia. Death Rates per Million Persons of All Ages

Year	Tuberculosis (All Forms)			Pneumonia		
	Gr. London	New York	Ratio	Gr. London	New York	Ratio
1931	893	704	1.27	881	1,323	0.67
1932	825	645	1.28	747	1,113	0.67
1933	831	647	1.28	736	1,086	0.68
1934	776	621	1.25	728	948	0.77
1935	700	610	1.15	591	891	0.66
1936	702	636	1.10	709	908	0.78
1937	684	588	1.16	740	896	0.83
1938	626	525	1.19	630	649	0.97
1939	640	520	1.23	555	576	0.96

New York's pneumonia death rate was much above that of Greater London during 1931-5, but in the short period 1936-8 the excess was reduced until approximate equality was attained in 1938 and 1939. There can be little doubt that this achievement may be credited to the great efforts made in the United States to combat pneumonia by serum therapy, and that the parallel decline noticeable in both cities since 1938 reflects the application of the new discoveries in chemotherapy.

Another cause from which New York has for long recorded a much higher death rate than London is appendicitis, but, as in the case of pneumonia, the rate of improvement since 1931 has been more rapid in the former city, with a resulting increase in the ratio between the average annual death rates from 0.47 in 1931-3 to 0.55 in 1934-6 and 0.57 in 1937-9.

Appendicitis. Death Rates per Million Persons of All Ages

Year	Gr. London	New York	Ratio	Year	Gr. London	New York	Ratio
1931	75	166	0.45	1936	72	145	0.50
1932	74	151	0.49	1937	72	129	0.56
1933	78	162	0.48	1938	68	113	0.60
1934	75	141	0.53	1939	60	109	0.55
1935	80	128	0.63				

The suicide rate (which in Greater London is not appreciably affected by allocation of deaths to the place of residence) was high in both cities during the years of economic depression, but since 1934 there has been little change, the London rate being about four-fifths of that in New York. For other violent deaths the ratio has tended to increase, Greater London's death rate being 54% of that in New York in the years 1931-2, rising to 68% by 1939. Correction of this death rate by allocation to place of residence brings about an increase of 6% in Greater London, and if the same is true of New York the corrected ratios will be 6% less than the figures tabulated.

Suicides and Other Violent Deaths per Million Persons of All Ages

Year	Suicide			Other Violence		
	Gr. London	New York	Ratio	Gr. London	New York	Ratio
1931	135	215	0.63	401	747	0.54
1932	154	227	0.68	376	690	0.54
1933	154	190	0.81	406	675	0.60
1934	149	174	0.86	409	691	0.59
1935	128	163	0.79	378	656	0.58
1936	125	155	0.81	385	639	0.60
1937	134	157	0.85	383	627	0.61
1938	134	171	0.78	350	566	0.62
1939	124	162	0.77	390	573	0.68

Turning finally to infant mortality rates from all causes, 22,934 deaths of infants under 1 year of age occurred in New York City in the period 1934-8, and when all deaths in New York State had been allocated to the place of residence the number was 22,744, or 1.7% less.¹ Births were affected to a similar extent, however (504,436 being reduced to 497,504, or by 1.4%), and the infant mortality rates based on live births may be regarded as free from any substantial error and comparable with those of Greater London. The increase in the ratio since 1935 shows that London has not kept pace with New York in its recent reduction in infant mortality, for whereas Greater London's

Infant Mortality per 1,000 Live Births

Year	Gr. London	New York	Ratio	Year	Gr. London	New York	Ratio
1931	59.0	55.6	1.06	1936	56.5	45.6	1.24
1932	59.6	50.9	1.17	1937	53.9	43.7	1.23
1933	54.2	53.2	1.02	1938	49.7	38.3	1.30
1934	57.2	52.2	1.10	1939	43.5	37.1	1.17
1935	51.2	47.6	1.08	1940	47.4*	34.9	1.36

* Provisional estimate.

average rate in 1931-3 was 8% above that of New York, the excess was 13% in 1934-6 and 24% in 1937-9. War conditions must inevitably further retard improvement in the London rate and increase the widening gap for the time being, but when the reconstruction period is reached careful consideration will need to be given to the reasons why New York began to draw ahead about 1936 in this important matter of infant survival, notwithstanding a more difficult climatic and racial background. The average annual death rates per 1,000 live births in the five years 1934-8 from some of the important causes are compared below:

	Greater London	New York
Prematurity	13.2	13.7
Injury at birth	2.4	4.6
Congenital malformations	5.3	4.8
Congenital debility	1.5	0.5
Diarrhoea and enteritis	8.6	4.7
Diseases of respiratory system	10.6	8.9
Other causes	12.1	6.6
All causes under 1 year	53.7	45.7
.. .. under 1 month	24.1	28.1
.. .. 1-12 months	29.6	17.6

¹ Births, Stillbirths, Maternal Mortality, and Infant Mortality; New York State, 1934-8. State Department of Health, 1940.

Greater London's post-natal death rate compares favourably with New York, the excess being amongst infants between 1 month and 1 year of age, and towards the total excess of 8 per 1,000 live births diarrhoea and enteritis contribute one-half and pneumonia and bronchitis about one-fifth. Infantile diarrhoea is sometimes regarded as a subjugated disease which has ceased to be an important cause of death, but it is well to realize that 8 or 9 infants out of each 1,000 born are still being certified as dying from this cause in London. Small though this may appear in comparison with figures of thirty years ago, the time for complacent self-congratulation on past achievements in public health has surely come to an end, and the point to be considered is why that which is being achieved now in New York cannot be also achieved in London. A keen rivalry between cities in the matter of their health indices, particularly for infants and children, comparable to what we have witnessed in the financial and other phases of our war efforts, should be our aim in the future, and in the case of Greater London, with its complex administration, this will entail team-work if New York's health record is to be overtaken in the post-war period.

HOSPITALS AND AIR RAIDS

ORGANIZATION OF A CITY CASUALTY HOSPITAL

It is the aim of our wartime medical services, albeit in the face of new, varying, and often difficult conditions, to provide with as little delay as possible the best possible initial treatment and to secure the fullest possible restoration to health and efficiency for each individual casualty. Stresses and numbers may sometimes necessitate, but must not become an excuse for, lower standards. Planning in advance can achieve much, but plans must be elastic and susceptible of quick change. Mistakes must be freely admitted and experiences constantly shared. Those severally responsible for the collection, transport, and treatment of wounded should have a proper understanding of each other's tasks and difficulties. More intensive aerial bombardment may yet await us.

In these notes the organization of a city hospital for the reception, treatment, and evacuation of casualties and associated duties are briefly reviewed. The notes are based on experience gained at a London teaching hospital working as a casualty clearing station and possessed, therefore, of the advantages of an ample student personnel for the provision of dressers, clerks, stretcher-bearers, runners, etc. The assistance which students have given can scarcely be overstressed. It is fully appreciated that, with their different constitution and prevailing shortage of male civilian personnel, other types of hospital must needs employ alternative measures. The suggestions outlined, however, with local variations, should be generally applicable to most large city hospitals equipped for the direct admission of casualties on a large scale.

It is well worth considering application to local Scout organizations for the night-time services, in return for supper and breakfast, of squads of Rover Scouts to assist with such duties as those of stretcher-bearer, tally clerk (for stretchers and blankets), or runner. For help as well as training the presence of St. John Ambulance men can also be arranged. As many wheel-trolleys as possible should be accumulated to lighten the work of the bearers.

In hospitals serving cities already bombed or liable to be bombed provision must be made for: (1) reception of cases from the ambulance; (2) preliminary inspection of injuries in the receiving room followed by administration of A.T.S. (unless it be decided to make a routine of giving it in the theatre when the patient is under the anaesthetic), the sorting of cases into categories according to severity, and the recording of particulars; (3) resuscitation; (4) operation; (5) subsequent treatment; (6) evacuation to a "base" hospital; and (7) mortuary identification and disposal.

Ideally the personnel required on duty at night during a raid in a hospital capable of receiving up to or over 100 casualties

should include: (1) a Medical Officer in Charge of staff rank; (2) a senior member of the surgical staff to supervise the surgical decisions of the resuscitation ward, the theatre, and the surgical wards generally; (3) operating surgeons sufficient for the available tables, say from three to five, preferably men of the standing of surgical registrar and sometimes including members of the general or specialist surgical staff; (4) a staff physician in charge of the resuscitation ward and for consultation with the surgeon in cases of wound shock or of chest or neurological injuries; (5) a receiving-room officer—either a member of the specialist staff or an experienced senior house-surgeon; (6) anaesthetists, of whom one should, if possible, be of staff and one of junior staff rank; (7) a radiologist or experienced radiographer; (8) house officers; (9) matron, sisters, nurses, and almoners; (10) engineering and domestic staff, porters, stretcher-bearers, and fire-watchers.

Duties of Senior Officers

1. The Medical Officer in Charge has numerous functions to perform during an air raid. He should be assisted by a responsible secretary or telephonist and a runner: the first of these at his office or night control room, the second either at the control room and kept informed as to his moves or accompanying him on his rounds. He must keep an eye on the number and rate of admissions, and when the hospital's capacity from the point of view of efficient surgery is nearing saturation must make contact by telephone (when possible) with Controls or through the local police with the ambulance service, or with a neighbouring hospital, stating his desire to divert convoys. In practice direct communication in any case with the neighbouring hospital is valuable in order to maintain a friendly reciprocity and to discover how far its staff may be working under stress or able and willing to receive. If other means of communication fail messages should be sent by a returning ambulance. He must tour the wards frequently during the raid to see that all is well and to reassure and encourage nursing staff and patients. It may be necessary for him to visit other parts of the institution or to look into some reported incident or difficulty. He may have to order the evacuation of a ward which has sustained damage or had its windows blasted, or call up extra personnel to deal with incendiary bombs, or summon the fire brigade. He must keep in touch with the matron and with the hospital engineer, who is one of his most valuable lieutenants and under whose direction the fire-watchers and their reliefs should usually be disposed. He must see that operating surgeons and theatre and resuscitation ward staff are relieved without undue delay after an all-night session. He must consult with the surgical officer in charge on matters of policy, and particularly in regard to the pressure of work and the evacuation of casualties on the following day.

2. The surgical O.C. visits the resuscitation ward (which should be a separate unit but as conveniently situated as possible for both the theatre and other casualty receiving wards) as soon as it begins to fill. He should there keep the personnel to a reasonable minimum to avoid congestion and the "too many cooks" tendency. When the first admissions have been attended to and have begun to benefit from the rest and warmth he should make a systematic tour of inspection, dictating a statement of the injuries in each case, ordering in consultation with the physician-in-charge (who remains in the ward) a transfusion here, a dressing or a dose of morphine there, marking up cases for examination with the portable x-ray plant, and entering against the names of the operating surgeons on a conveniently placed blackboard at the entry to the ward the bed-numbers of the cases selected for them in order of need and paying due regard also to the skill and experience of the individual surgeons. He has the same functions to perform in respect of the ward or wards to which the less severe cases are admitted and from which cases are drawn for the theatre pending the resuscitation of the more severe. The graver cases may be conveniently returned after operation to the resuscitation ward to ensure continuity of treatment. He may at intervals give advice in the theatre, and when admissions are few or his other tasks are done he may elect to take a table himself for a selected case or cases. Operating should never, however, be considered his prime function. On the morning following a raid he should help his operating colleagues and their house-surgeons with the selection of cases for immediate evacuation, and he may here need to be guided