The effect of the cold weather in the early part of 1895 on the admission of medical cases into the Royal Edinburgh Infirmary. With a note on some earlier periods of severe weather / by A. Lockhart Gillespie.

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"*The effect of the Cold Weather in the Early part of 1895 on the Admission of Medical Cases into the Royal Edinburgh Infirmary. With a note on some earlier periods of Severe Weather*," *by* A. LOCKHART GILLESPIE, M.D., F.R.C.P.E.

IN a paper read before the Royal Society of Edinburgh in 1896, I gave the results of an investigation into the influence of various weather conditions on the type of the cases admitted into the medical wards of the Royal Edinburgh Infirmary. The remarkable divergence between the meteorological conditions prevailing during the earlier weeks of 1895 and of 1896 led me to work out the differences of the admissions into these wards for the two periods. The figures for several cold periods which have occurred during recent years were also noted.

The periods under review comprise the first eleven weeks of 1895 and 1896; six weeks from December 7th, 1874, to January 17th, 1875; eleven weeks from December 2nd, 1878, to February 16th, 1879; twelve weeks from November 15th, 1880, to February 6th, 1881; five weeks from November 26th, to December 31st, 1882; and seven weeks from December 8th, 1890, to January 24th, 1891. As a standard, the means for the seven years from October 1st, 1888, to September 30th, 1895, as given in the former paper, are taken, and though it should be remembered that the means of the actual numbers are of little value owing to the increased number of admissions, the percentages of admissions of particular classes of disease to the total admissions are, of course, directly comparable.

Noticing first the eleven weeks which began the years 1895, 1896, we find that the mean temperature of these weeks in the east of Scotland district of the Meteorological Council, was only 30°·9 in 1895, 39°·9 in 1896. The highest shade temperature recorded were almost identical, 58° and 57°, but the minimum in 1895 fell as low as − 17°, against 18° in 1896. The mean of the weekly maxima in 1895 was 45°·4, the minima 7°·5, in 1896 53°·6 and 24°·1 respectively. The total excess of the temperature mean in 1896, compared with 1895, for the eleven weeks reached the large figures of about 99°. The rainfall was almost the same for both periods, 4·70 in. and 4·24 in.; the percentage of possible sunshine was also very similar, 22·5 per cent. and 24·0 per cent., while during both the barometric type was identical, six weeks anti-cyclonic and five weeks cyclonic.

On turning to the admissions into the Infirmary (see Table I.) we find that the total admissions into the medical wards averaged 93·6 per week in 1895, 84·5 per week in 1896, or a decrease of

TABLE I.

Showing the differences between the Admissions during the First Eleven Weeks of 1895 *and* 1896.

YEAR.	Thermometer.			Rain.	% of Possible Sun.	Type.	Total Admissions.	Deaths.	Pneumonia.	Pleurisy.	Total Respiratory	Cardiac.	Nervous.	Rheumatism.	Digestive.	Kidney.
	High'st.	Lowest.	Mean.													
				IN.	HRS.											
1895	58	−17	30·9	4·7	22·5	A 6 / C 5	1031	99	47	26	238	83	122	39	151	35
1896	57	18	39·9	4·24	24·0	A 6 / C 5	930	74	31	28	197	108	146	37	136	75
Weekly Numbers.																
1895	45·4	7·5	30·9	·43	22·5	.....	93·6	9	4·2	2·3	21·6	7·5	11·1	3·5	13·6	3·2
1896	53·6	24·1	39·9	·38	24·0	.....	84·5	6·7	2·8	2·5	18·0	9·8	13·2	3·3	12·3	6·8
Percentages to Total Admissions.																
1895	...	...	...	...	...	.....	.....	9·6	4·5	2.5	23·08	8·05	11·8	3·77	14·5	3·39
1896	...	...	...	...	...	.....	... ...	7·9	3·3	3·01	21·1	11.6	15·7	3·9	14·5	8·06
The Five Coldest Weeks of 1895. *Percentages to Total Admissions.*																
1825	40·4	−4·8	26·0	·28	28·2	.....	91·4	9·6	3·9	3·2	24·9	7·4	12·0	3·4	14·8	2·56

nearly 9 per cent. Disregarding the actual admissions, the percentage of admissions of separate diseases or classes of disease to the total admissions of all kinds, are instructive. The rate of mortality is much higher, the proportion of patients admitted with pneumonia, and with respiratory disorders as a whole, is increased in 1895, the proportion of other cases is lower than in the corresponding period of 1896. This is most marked in the case of kidney disease, and reaches 50 per cent. Cases both of heart disease and of nervous affections are more numerous in the warmer year. The digestive cases are the same in both years.

Five of the first eleven weeks of 1895 were very cold, the 2nd and the 5th to the 8th. The mean temperature was 26°·0, the mean of the maxima 40°·4, of the minima 4°·8. Four of these weeks were anti-cyclonic. During these five weeks the total admissions were rather less than in the other six, while the percentage of admissions to the total were little changed, except that the respiratory cases were more in number.

Of the six weeks which were rather warmer, three preceded and three followed the period of greatest cold in 1895.

The three weeks following had a mean temperature of 36°·8, a large total admission, 105 per week, a high death-rate, 11·3 per cent.; a very large proportion of cases of acute pneumonia, 7·3 per cent., and of total respiratory cases 28 per cent. Cases of acute rheumatism were very common, 3·4 per cent.

I have drawn up a short table (Table II.) showing the relationship between the cyclonic and anti-cyclonic periods in the eleven first weeks of the two years. In 1895 the greatest cold accompanied anti-cyclonic weather, in 1896 cyclonic weather.

The cold dry weather in 1895 was marked by a greater death-rate than the warm dry weather of 1896, but the respiratory cases were much the same in number in both. A great excess of heart cases were admitted during the six dry weeks of

Table II.

The first Eleven Weeks of 1895 and 1896 arranged as to Barometric Type, in Weekly Means.

CYCLONIC.

	Year.	Temperature.	Rain.	Total Admissions.	Deaths.	Pneumonia.	Pleurisy.
Cyclonic, 5 weeks.	1895	32·1°	·60 in.	93	7·0	4·6	2·2
	1896	38·7°	·56 in.	84·6	6·0	2·4	2·4

	Year.	Total Respiratory.	Cardiac.	Nervous.	Acute Rheumatism.	Digestive.	Kidney.
Cyclonic, 5 weeks, *con.*	1895	22·2	8·8	11·6	3·6	12·8	3·2
	1896	16·4	10·0	13·8	2·6	12·4	8·0

ANTI-CYCLONIC.

	Year.	Temperature.	Rain.	Total Admissions.	Deaths.	Pneumonia.	Pleurisy.
Anti-cyclonic 6 weeks.	1895	29°·9	·28 in.	94·3	10·6	4·0	2·5
	1896	40°·9	·24 in.	84·5	7·3	3·1	2·6

	Year.	Total Respiratory.	Cardiac.	Nervous.	Acute Rheumatism.	Digestive.	Kidney
Anti-cyclonic 6 weeks, *con.*	1895	21·1	6·5	10·6	3·5	14·5	3·2
	1896	19·1	9·6	12·8	4·0	12·3	5·8

1896. The wetter weeks, warmer than the dry in 1895, colder in 1896, show a great excess of cases of pneumonia in the first, and a large excess of kidney cases in the second. The total cases of respiratory disease were most numerous in the wet weather of 1895, more so than in the very cold dry weeks, the opposite holding good for 1896. The colder weeks of 1895 were accompanied with dry northerly winds and fine weather, and had less effect on the admissions than the warmer and moister weeks.

On going back as far as 1874, although there were several short spells of extremely cold weather, I can find only six pronounced periods in which the temperature remained very low for a more or less prolonged period. The periods are:

1. Dec. 7 to Jan. 17, 1874—75. Four of these six weeks were very cold.
2. Dec. 2 to Feb. 16, 1878—79. Nine of these eleven weeks were very cold.
3. Nov. 15 to Feb. 6, 1880—81. Eight of these twelve weeks were very cold.
4. Nov. 27 to Dec. 31, 1882. Two of these five weeks were very cold.
5. Dec. 8 to Jan. 28, 1890—91. Five of these seven weeks were cold.
6. Jan. 1 to Mar. 17, 1895. Five of these eleven weeks were *extremely* cold.

In Tables III. and IV. the numbers for the different classes of admissions are grouped together. The weekly mean temperature for the thirty-three very cold weeks only reached 30° Fahr. The total admissions during these thirty-three weeks were below the average, for the fifteen weeks after (which where investigated) they were above it. A glance at the figures in Table IV. will show that (taking only the percentage of admissions of individuals or diseases to the total admissions as being exactly comparable) the death-rate in the hospital rose

during and after the cold periods, the number of cases of pneumonia and pleurisy, and of the total respiratory diseases rose at these periods also, those admitted with pleurisy especially. Heart cases were little affected; nervous cases still less; patients with acute rheumatism were not more numerous, nor were cases of kidney or digestive disorders. In the same Table the percentage figures for the entire seven years from 1888—1895, are given for comparison, and we may note that during the periods under review, the only classes of cases which differ materially are the cardiac, which is above, the nervous, which is below, and the acute rheumatism, which is much above the average percentage to admissions for the seven years. That is to say, that though the figures for these diseases for the periods before, during and after the cold spells, do not vary much, they differ very materially from the mean of a large number of years. Considerable stress is laid on this, as also in a former paper, or the marked influence of epidemics of influenza might be laid at the door of weather conditions. But as is shown there, influenza is a much more powerful agent in increasing the number of respiratory patients than cold weather, while cardiac and nervous cases increase in number some time after an attack rather than during it, and this quite irrespective of the weather conditions.

TABLE III—*Periods Investigated.*

No.	Year.	Number of Weeks.	Cold Weeks.	Mean Temp. of Cold Weeks.	Total Admissions.	Weekly Total.	Total during Cold Weeks.	Weekly total in cold weather.
1	1874—1875	6 (Dec. 7—Jan. 31)	4	31°·4	266	44·5	149	37·25
2	1878—1879	11 (Dec. 2—Feb. 16)	9	31·0	459	41·7	372	41·3
3	1880—1881	12 (Nov. 15—Feb. 6)	8	29·9	520	43·3	334	41·7
4	1882	5 (Nov. 27—Dec. 31)	2	28·2	250	50·0	90	45·0
5	1890—1891	7 (Dec. 8—Jan. 28)	5	33·6	518	74·0	365	72·1
6	1895	11 (Jan. 1—Mar. 17)	5	26·0	1031	93·6	457	91·4
	Totals...	52	33	30·0	3044	58·5	1767	53·5
Weeks before		4*	...	...	315	78·7	(Mean of whole periods in same years = 82·7).	
Weeks after ..		15	...	...	962	64·12	Do. do. = 58·2.	

* 1 in 1882; 3 in 1895.

Table IV.

Cold Period from 1874 *to* 1895.

Period.		Total Admissions.		Deaths.	Pneumonia.	Pleurisy.	Total Respiratory.	Cardiac.	Nervous.	Acute Rheumatism.	Digestive.	Kidney.
		Actual.	Mean for Totals in same Years.									
Cold Weeks.....	Weekly	53·5	58·5	7·0	2·66	1·9	12·48	5·6	6·6	2·14	6·58	2·5
(33)	Percentage to Total ...	.....	.....	12·5	4·9	3·5	27·0	10·4	12·3	4·0	12·2	4·6
Weeks before ...	Weekly	78·7	82·7	5·7	2·5	1·5	12·2	9·5	10·2	3·2	10·7	4·0
(4)	Percentage to Total ...	.....	.....	7·3	3·0	1·9	15·5	12·0	13·0	4·1	13·6	5·0
Weeks after.....	Weekly	64·12	58·2	7·6	2·73	1·8	17·13	6·3	9·0	2·73	8·86	2·86
(15)	Percentage to Total ...	.....	.....	11·7	4·2	2·8	26·7	9·8	14·0	4·2	14·0	4·4
	Mean for Seven Years Weekly ...		75·5	7·24	3·05	2·58	15·95	6·87	12·35	2·04	10·21	3·44
	1888–1895. Percentage to Total		.....	9·59	4·04	3·43	21·3	9·01	16·34	2·7	13·41	4·5

We may fairly conclude that a mean temperature which is very, or even extremely low, if it be steadily so, is not nearly so productive of evil effects as one which has a higher mean, but greater variations. That severe cold under cyclonic conditions, or even moderate cold at those times are more dangerous to health, than very extreme cold under anti-cyclonic periods, if the anti-cyclonic weather, as in 1895, be fine. While consistently warm cyclonic weather has not such a malign influence on the body as a muggy, foggy, anti-cyclone, even when the temperature is high. The anti-cyclonic weeks at the beginning of 1895 had a percentage of 27·1 of possible sunshine in the east of Scotland, the cyclonic weeks only 17 per cent. In 1896 the cyclonic weeks showed 28·2 per cent., the anti-cyclonic 20·5 per cent. The admissions of respiratory cases exactly correspond inversely to the percentage of sunshine recorded.

Year.	Cyclonic.		Anti-Cyclonic.	
	Sunshine Per cent.	Weekly Respiratory Admissions.	Sunshine Per cent.	Weekly Respiratory Admissions.
1895	17·0	22·2	27·1	21·1
1896	28·2	16·4	20·5	19·1

It is impossible to treat of the other periods mentioned in terms of weather type, as no records for the purpose exist.

A point worth mentioning, however, with regard to the admissions of patients suffering from acute rheumatism, might be added. The mean weekly admission of cases of that disease for the seven years 1888-95, when the total admissions were, of course, much more numerous, was 2·04, the percentage to total 2·7. The weekly admission for the fifty-two weeks investigated was 2·42; for the thirty-three colder weeks 2·1; the relative percentages to total admissions being 4·1 per cent. and 4·0 per cent.

TABLE III.

Showing the Weekly Differences between the Admissions into the Medical Wards during the First Eleven Weeks of 1895 *and* 1896, *with the Weekly Meteorological Conditions Added. The Admissions Entered as Percentages of Totals.*

No. of Week.	Thermometer.			Rain.	Sunshine.	Type.	Total Admissions.	Deaths.	Pneumonia.	Pleurisy.	Total Respiratory.	Cardiac.	Nervous.	Rheumatism.	Digestive.	Kidney.
	High.	Low.	Mean.		%			%								
1—95	42	13	31·8	·3	13	C	61	13·1	4·9	...	18·0	4·9	13·1	4·9	14·7	4·9
96	53	26	40·9	·5	15	A	77	7·8	5·2	3·9	20·7	12·9	9·09	5·2	5·2	3·9
2—95	39	−5	25·2	·3	22	C	104	6·7	2·8	6·7	33·6	10·5	10·5	2·8	12·5	1·9
96	53	22	37·3	·04	15	A	92	9·7	4·3	1·09	22·8	14·1	11·9	7·2	12·9	3·2
3—95	42	24	35·0	1·7	8	C	99	9·9	2·02	1·01	11·1	9·09	14·1	7·07	16·1	6·6
96	54	20	39·2	·7	28	C	96	2·08	3·1	4·16	21·8	9·3	17·9	2·08	8·32	0·9
4—95	43	19	32·0	·4	20	C	99	2·02	3·03	1·01	13·1	13·1	15·1	2·02	14·1	4·04
96	50	18	37·4	·2	33	A	71	5·6	1·4	1·4	23·9	12·6	12·6	2·8	23·9	8·4
5—95	41	1	27·5	·5	13	A	79	10·1	5·06	3·9	24·0	5·06	12·6	5·06	11·4	1·26
96	56	28	41·6	·4	27	A	80	6·2	3·7	5·0	25·0	11·2	13·7	3·7	18·7	3·7
6—95	40	−12	24·6	·3	24	A	93	12·9	1·07	0·0	12·9	9·6	13·9	2·1	15·04	4·5
96	54	28	43·4	·2	14	A	96	5·2	5·2	3·1	19·8	8·32	15·6	2·08	17·2	9·3
7—95	43	−17	23·1	·1	50	A	93	8·6	4·3	1·07	25·8	8·6	15·04	5·3	15·04	4·5
96	56	34	45·1	·1	19	A	91	16·4	2·19	4·4	24·1	9·89	26·3	6·5	12·1	7·6
8—95	49	9	29·8	·2	32	A	88	10·2	6·8	4·5	27·2	4·5	7·8	2·2	18·3	1·1
96	53	22	40·2	·4	16	C	76	6·5	1·3	2·6	10·5	11·8	21·0	0·0	18·4	9·2
9—95	49	19	35·4	·3	29	A	99	11·1	2·02	5·05	23·2	10·1	7·07	0·0	16·1	6·06
96	52	23	36·9	·8	39	C	84	14·2	0·0	1·19	16·6	14·2	22·6	2·37	11·9	9·5
10—95	54	18	36·3	·3	22	C	102	8·8	11·7	1·9	40·1	7·8	9·8	2·9	11·7	0·9
96	52	25	38·7	·7	17	C	87	5·7	2·3	2·3	20·6	14·9	6·9	4·6	17·1	8·04
11—95	58	14	38·9	·3	15	A	114	14·0	6·1	1·7	21·9	3·4	11·4	7·0	14·0	2·6
96	57	20	38·7	·2	41	C	80	7·5	7·5	3·7	25·0	8·7	13·7	6·2	18·7	8·7

Dr. MALCOLMSON (Middlesborough) said he came from a place at the mouth of the Tees where they were troubled every spring with epidemics of bronchitis and pneumonia. So great had the pneumonia epidemic been that the Local Government Board had held extensive enquiries, and he found that instead of the east winds being beneficial, it was the exact reverse. So much was this the case that the inhabitants used the expression that it seemed like a pneumonia day. He attributed it, not so much to the cold, but to often getting bright sunshine and tolerable temperature during the day. and at night a cold fog and east wind up from the river and sea. It was the sudden variations of temperature, and not the extreme cold that was the cause of their pneumonia.

THE PRESIDENT of the Section (Mr. W. H. Dines) said he was used to London fogs, and, having passed through Middlesborough and seen the smoke, he was not surprised to find pneumonia so prevalent there.

Dr. GILLESPIE (Edinburgh) said as far as he knew Edinburgh only educated people, printed books, and brewed beer, none of which gave rise to much smoke. Edinburgh air was very clear.

Mr. G. J. SYMONS (London) said they must recollect that the work done here had not all been done that day. Some of it had been done beforehand. Notably was that the case with the President who had honoured them by preparing the address. Fortunately, amongst those present were included the representatives of the Press. If we were only twenty or thirty persons in the room, there were through them 200,000, or more, who would eventually see and hear what was going on. He was quite sure those few who were left would all be quite unanimous in thanking Mr. Dines for the trouble he had taken to prepare the address, and for coming there to preside over the Section.

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