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FIRES IN HOSPITALS

by

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SUMMARY

The numbers of fires in hospitals has been increasing at about the same rate as all fires in buildings, having risen from 590 in 1963 to an estimated 684 in 1968. This report is based on information obtained from a 1-in-4 sample of reports of fires which occurred in 1968.

Two hundred and ninety-two of the fires were in mental hospitals.

Nearly two-thirds of all the hospitals involved were built before 1910.

It is estimated that 144 fires occurred in wards, 48 being attributed to smoking materials and 40 to malicious ignition. The peak time of the day for hospital fires was between 1800 and 2059. Next to wards, the worst areas were stores (80 fires) and kitchens (76 fires). Eight fires occurred in operating theatres.

The most important causes of fires in hospitals were smoking materials (184 fires), malicious ignition (104) and cooking appliances (all fuels) (68). The first two of these causes accounted for 65 per cent of the fires in mental hospitals.

Only $6\frac{1}{2}$ per cent of the fires spread beyond the room of origin. Five hundred and fifty-six of the fires were tackled before the arrival of the fire brigade; of these 396 were successfully extinguished. The most common methods of extinction used before the arrival of the fire brigade were extinguishers (160 fires), water from buckets or immersion (112 incidents) and inside hose reels/hydrants (104 fires).

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INTRODUCTION

The information in this report is based mainly on a study of a 1-in-4 sample of reports received from fire brigades in 1968. The investigation was prompted by a few rather serious fires in hospitals. Fires in hospitals increased steadily during the period 1963 - 1968, there being 590 fires in 1963 and an estimated 684 in 1968. This rate of increase is approximately the same as for all fires in buildings.

TYPES OF HOSPITAL

Information on the type of hospital involved was obtained from the reports of fires received from fire brigades and the Hospitals Year Book¹. It is difficult to give a specific classification to all those hospitals in which fires occurred, but of the 171 fires in the 1-in-4 sample of reports in 1968 (giving an estimated frequency of 648 for the year), 73 (about 43 per cent) were reported to have occurred in Mental hospitals, 47 (about 27 per cent) in General Hospitals, 15 (9 per cent) were in hospitals specialising in "long-stay" patients (e.g. tuberculosis) and 12 (7 per cent) were in nursing homes. The remaining 24 included childrens hospitals, maternity hospitals, doctors residential quarters, etc.

Information on the ages of the hospitals showed that 39 per cent of those of which the age was known were built before 1900, and a further 27 per cent between 1900 and 1909. There is no indication that fires are more likely to occur in older hospitals, since the age distributions of hospitals at risk is unknown and may be similar to that of the hospitals involved.

WHEN AND WHERE FIRES OCCUR

The place of origin of the fires is related to the time of call to the fire brigade in Table 1. It can be seen that about 21 per cent occurred in wards and mainly during the day. About 12 per cent were in storage areas and 11 per cent in kitchens.

Table 1: Place of origin in relation to time of day

Place of origin	TOTAL	Time of day							
		0000-0259	0300-0559	0600-0859	0900-1159	1200-1459	1500-1759	1800-2059	2100-2359
TOTAL	684	60	28	52	120	116	96	136	76
Ward	144	16	-	8	32	20	24	16	28
Store	80	8	4	8	4	12	16	20	8
Kitchen	76	4	-	4	16	24	-	20	8
Cloakroom, bathroom, etc	48	-	4	-	8	8	8	12	8
Lounge	40	12	-	4	4	4	8	8	-
Corridor, hall, stairs, lift	40	-	4	-	8	4	16	8	-
Structure	28	4	-	8	-	8	-	8	-
Bedroom (not in ward*)	24	4	4	4	8	-	-	-	4
Laundry	20	-	4	-	4	4	-	4	4
Operating theatre	8	-	-	-	4	-	-	-	4
Other (specified)	60	4	-	12	16	8	4	8	8
Not stated, not applicable	116	8	8	4	16	24	20	32	4

* e.g. in doctors' living quarters

The majority of the fires in wards occurred during the day, (0900 - 2059), but quite a substantial number (30 per cent) occurred between 2100 and 0259. About half of these night-time fires were attributed to smoking materials.

SOURCES OF IGNITION

The source of ignition of fire is related to place of origin in Table 2 and to the time of call in Table 3.

Table 2: Source of ignition in relation to the place of origin

Source of ignition	TOTAL	Place of origin											
		Ward	Store	Kitchen	Cloakroom, bathroom etc.	Lounge	Corridor, halls, stairs, lift	Structure	Bedroom (not ward)	Laundry	Operating theatre	Other (specified)	Not stated, not applicable
TOTAL	684	144	80	76	48	40	40	28	24	20	8	60	116
Smoking materials	184	48	24	-	16	12	20	4	16	4	-	12	28
Electric appliances Total	136	32	12	16	4	-	8	4	4	4	4	12	36
Wire and cable	28	12	-	4	-	-	4	4	-	-	-	-	4
Space heating	16	-	-	-	-	-	-	-	4	-	-	8	4
Wireless, television	16	8	-	-	-	-	4	-	-	-	-	-	4
Refrigerator	12	-	4	-	-	-	-	-	-	-	-	-	8
Cooking	8	-	-	8	-	-	-	-	-	-	-	-	-
Other	56	12	8	4	4	-	-	-	-	4	4	4	16
Malicious ignition	104	40	16	-	12	4	8	-	4	-	-	4	16
Gas appliances Total	48	-	-	44	-	-	-	-	-	-	-	-	4
Cooking	44	-	-	44	-	-	-	-	-	-	-	-	-
Other	4	-	-	-	-	-	-	-	-	-	-	-	4
Oil appliances	16	4	-	-	-	-	-	4	-	-	-	4	4
Solid fuel appliances	8	-	-	-	-	-	-	-	-	-	-	-	8
Acetylene appliances	8	-	-	-	-	-	-	-	-	-	-	4	4
L.P.G appliances	4	-	-	-	-	-	-	4	-	-	-	-	-
Unspecified fuel appliances													
- Total	28	8	-	16	-	-	-	-	-	-	-	4	-
Cooking	16	-	-	16	-	-	-	-	-	-	-	-	-
Other	12	8	-	-	-	-	-	-	-	-	-	4	-
Other known causes	64	12	-	-	4	8	-	12	-	8	-	12	8
Unknown	84	-	28	-	12	16	4	-	-	4	4	8	8

Table 3: Source of ignition in relation to time of call

Source of ignition	TOTAL	Time of call							
		0000-0259	0300-0559	0600-0859	0900-1159	1200-1459	1500-1759	1800-2059	2100-2359
TOTAL	684	60	28	52	120	116	96	136	76
Smoking materials	184	12	8	16	28	24	44	24	28
Electric appliances - Total	136	16	8	12	24	28	16	16	16
Wire and cable	28	4	-	4	12	-	4	-	4
Space heating	16	4	-	-	8	-	-	4	-
Wireless, television	16	-	-	-	4	8	4	-	-
Refrigerator	12	4	4	-	-	4	-	-	-
Cooking	8	-	-	-	-	4	-	-	4
Other	56	4	4	8	-	12	8	12	8
Malicious ignition	104	8	4	8	20	12	12	32	8
Gas appliances - Total	48	-	-	4	12	20	-	12	-
Cooking	44	-	-	4	12	16	-	12	-
Other	4	-	-	-	-	4	-	-	-
Oil appliances	16	4	-	4	4	-	-	4	-
Solid fuel appliances	8	-	-	-	4	-	-	4	-
Acetylene appliances	8	-	-	-	-	-	-	4	4
L.P.G appliances	4	-	-	-	-	4	-	-	-
Unspecified fuel appliances Total	28	4	-	-	12	4	-	4	4
Cooking	16	4	-	-	-	4	-	4	4
Other	12	-	-	-	12	-	-	-	-
Other known causes	64	4	-	4	8	16	12	16	4
Unknown	84	12	8	4	8	8	12	20	12

It can be seen that the most prominent known causes of hospital fires were smoking materials, electrical apparatus and wiring, and malicious ignition. These accounted for 62 per cent of the fires. It will be noticed in Table 2 that smoking and malicious ignition figure prominently among the causes of fires in wards and in stores and it will be shown later that in mental hospitals nearly 66 per cent of fires were attributed to these two causes. Cooking appliances of all types accounted for about 10 per cent of all hospital fires.

In Table 3, it can be seen that smoking material fires are more prominent during the latter half of the day. Rules on smoking differ between hospitals and it is possible that some of these fires can be attributed to hospital visitors. Malicious fires appear to be most prominent during the periods 09.00 - 11.59 and 18.00 - 20.59.

It is not surprising that bedding features prominently among the materials ignited first and from Table 4 it may be seen that, of an estimated 88 incidents of this type 32 were malicious, all but four of the remainder of these incidents were attributed to smoking materials. There were 60 incidents in which food was ignited by cooking appliances. The materials first ignited are shown in Table 4.

Table 4: Materials ignited in hospital fires

Material ignited first	No. of fires	Per cent
TOTAL	684	100.0
Bedding	88	12.9
by smoking materials	52	7.6
by malicious ignition	32	4.7
by unknown means	4	0.6
Food	60	8.8
Insulation	48	7.0
Clothing not on person	32	4.7
- by malicious ignition	16	2.3
- by other means	16	2.3
Upholstery	28	4.1
Other furniture and furnishings	32	4.7
Other (specified)	228	33.3
Unspecified waste	64	9.4
Unknown	104	15.2

EXTENT OF FIRE

The extent of fire is shown in Table 5 in relation to the extent of fire in all buildings other than derelict buildings and buildings under demolition².

Table 5: Extent of fires in hospitals and all buildings

Extent of fire	Fires in hospitals		Fires in other buildings*	
	No.	Per cent	No.	Per cent
Confined to - exterior components - appliance - common service spaces [†] Cumulative Total	16	2.34	2440	2.92
	128	18.71	15216	18.19
	24	3.51	2868	3.43
	168	24.56	20524	24.53
Confined to - room of origin (contents only) - room of origin (structure involved) Cumulative Total	280	40.94	16892	20.19
	192	28.07	22676	27.11
	640	93.57	60092	71.83
Confined to - floor of origin - building of origin Cumulative Total	16	2.34	2508	3.00
	28	4.09	18380	21.97
	684	100.00	80980	96.80
Spread beyond building of origin	-	-	* 2652	3.17
TOTAL	684	100.00	83656	100.00

* Excluding fires in derelict property and buildings under demolition.

† Corridors, halls, stairs, lift

* Does not include 24 fires (0.03 per cent) of unknown extent.

The table shows that a higher proportion of fires in hospitals are confined to the room of origin than in other buildings, this is probably accounted for by greater amount of supervision in hospitals than in other buildings. Of the 236 fires which involved the structure, 28 were attributed to malicious ignition, 40 to smoking materials and 32 were of unknown cause. A further 24 fires involving structural damage were due to cooking appliances.

METHODS OF EXTINCTION OF FIRES

There appears to be very little specific legal requirement for the provision of fire fighting equipment. The responsibility of fire prevention, fire fighting and evacuation is that of the hospital authority. However guidance on fire matters is given in a Hospital Technical Memorandum issued by the Department of Health and Social Security³.

There were 396 fires (58 per cent) successfully extinguished before the arrival of the fire brigade. This compares well with the 24 per cent of all fires in buildings that did not need brigade assistance. This can be explained by (i) a greater readiness to call the brigade to trivial fires because of the risks involved.

(ii) most, if not all hospitals are provided with some form of "first-aid" fire fighting equipment.

Details of methods of extinction used are given in Table 6.

Table 6: Method of extinction of fires

Method of extinction	TOTAL	Extinguished before arrival of fire brigade	Extinguished by fire brigade
TOTAL	684	396	288
Extinguishers	124	100	24
Water from buckets	88	84	4
Removal	72	32	40
Beating, smothering	52	40	12
Water from hand pumps	12	-	12
Immersion	8	8	-
Allowed to burn out	24	24	-
Other small non-chemical means	44	40	4
Two or more of above methods	16	16	-
Hose reel jets	128	-	128
Inside hose reel/hydrants	76	52	24
Jets from pumps, hydrants	40	-	40

Of the 684 hospital fires, 556 (81 per cent) were tackled before the arrival of the fire brigade, which would be expected to reduce the chance of spread. Table 7 shows the effectiveness of fire-fighting before the arrival of the fire brigade.

Table 7: Methods of extinction used before arrival of the fire brigade

Method of extinction before arrival of fire brigade	TOTAL	Successfully extinguished	Not extinguished	Percentage extinguished
TOTAL	556	396	160	77.2
Extinguishers	160	100	60	62.5
Water from buckets, immersion	112	92	20	82.1
Beating, smothering	52	40	12	76.9
Removal	40	32	8	80.0
Allowed to burn out	24	24	-	100.0
Other small non-chemical means	40	40	-	100.0
Two or more of above methods	24	16	8	66.7
More powerful methods*	104	52	52	50.0

* Mainly internal hose reels/hydrants

It appears from the table that the most effective first-aid fire-fighting medium is water, but the differences have no real statistical significance. Of those incidents in which internal hose reels were used, an estimated 50 per cent were successfully extinguished.

RESCUES, ESCAPES AND CASUALTIES

There have been several incidents recently in which there have been rescues, escapes or casualties. The number of fatal casualties during the years 1963 - 1968 are shown in Table 8.

Table 8: Fatal casualties in hospital fires, 1963 - 1968

	Year					
	1963	1964	1965	1966	1967	1968
No. of fatal fires	7	9	3	9	5	5
No. of deaths	8	9	3	9	5	28

The main analysis has been based on a 1-in-4 sample of reports received in 1968 and because of the small number, can reveal little statistical information on rescues, escapes and casualties. Reference is made below to some of the more serious incidents in 1968 and 1969.

The most serious incident was at Shelton Mental Hospital in February 1968 in which 24 women, mainly elderly, died⁴. This fire was thought to have been caused by a carelessly discarded cigarette in a day room adjoining a ward in which 42 "severely disturbed" patients were asleep under sedation. A feature of this incident was the lack of fire training at the hospital and a delay in calling the fire brigade⁵. Another incident of note in 1968 was at a hospital in Exeter in which it was deemed advisable to evacuate a large number of patients.

In 1969, there was a fire at the Carlton Hayes Mental Hospital⁶, in which four people died - another 38 were able to escape. This fire, like the Shelton Hospital incident occurred during the night and was attributed to smoking materials.

A preliminary analysis of 1969 reports showed that there were 8 incidents involving rescues and escapes - three of these in addition to the Carlton Hayes fire, involved a mass evacuation.

MENTAL HOSPITALS

There were 73 fires in the 1-in-4 sample (giving an estimated 292 fires) in mental hospitals, 83 in other hospitals and 15 in ancillary buildings, e.g. doctors quarters. According to the Annual Abstract of Statistics⁷, the average daily occupation of beds in psychiatric departments in 1968 was 179,000 and in other departments 206,000. These figures suggest that fires in mental hospitals are no more likely than in other hospitals, but it is possible that the type of fires in mental hospitals are different from those in other hospitals and it is of interest to consider various aspects of fire in relation to the type of hospital involved.

Time of call

The time of call to fires in mental and other hospitals are shown in Table 9.

Table 9: Time of call to fires in relation to type of hospital

Type of hospital	TOTAL	Time of call							
		00.00-02.59	03.00-05.59	06.00-08.59	09.00-11.59	12.00-14.59	15.00-17.59	18.00-20.59	21.00-23.59
TOTAL	684	60	28	52	120	116	96	136	76
Mental	292	40	8	20	40	44	52	56	32
Other	392	20	20	32	80	72	44	80	44

Except in the three hour period after midnight, when the frequency in mental hospitals is appreciably higher than that in other hospitals, there is no significant difference between the times of call in the two groups.

Place of origin

The places of origin of the fires are shown in Table 10 in relation to the type of hospital.

Table 10: Place of origin in relation to type of hospital

Place of origin	TOTAL	Type of hospital	
		Mental	Other
TOTAL	684	292	392
Ward	144	84	60
Store	80	40	40
Kitchen	76	8	68
Cloakroom, bathroom, etc	48	20	28
Lounge	40	28	12
Corridor, hall, stairs, lift	40	28	12
Structure	28	-	28
Bedroom (not in ward)	24	16	8
Laundry	20	-	20
Operating theatre	8	-	8
Other (specified)	60	28	32
Not stated, not applicable	116	40	76

From the table it can be seen that ward fires are more frequent in mental than in other hospitals. The same is true for fires originating in lounges and common service areas (corridor, hall, etc). Fires in kitchens are less prominent in mental hospitals than in other hospitals. This distribution of places of origin is obviously related to the source of ignition which is shown in Table 11.

Source of ignition

Table 11: Source of ignition in relation to type of hospital

Source of ignition	TOTAL	Type of hospital	
		Mental	Other
TOTAL	684	292	392
Smoking materials	184	112	72
Electric appliances Total	136	20	116
Wire and cable	28	4	24
Space heating	16	12	4
Wireless, television	16	-	16
Refrigerator	12	-	12
Cooking	8	-	8
Other	56	4	52
Malicious ignition	104	80	24
Gas appliances Total	48	-	48
Cooking	44	-	44
Other	4	-	4
Oil appliances	16	4	12
Solid fuel appliances	8	-	8
Acetylene appliances	8	-	8
L.P.G appliances	4	-	4
Unspecified fuel appliances Total	28	12	16
Cooking	16	8	8
Other	12	4	8
Other known causes	64	16	48
Unknown	84	48	36

The majority of fires in mental hospitals are attributed to smoking materials (112 fires - 38 per cent), malicious ignition (80 fires - 27 per cent) and unknown causes (48 fires - 16 per cent). Although these sources of ignition feature prominently in fires in other hospitals, electrical causes and cooking appliances are also major sources of ignition.

As might be expected from the locations and sources of ignition, comparison of materials ignited by type of hospital shows that incidents involving the ignition of bedding, furnishings or clothing (not on person) occur in greater proportions in mental hospitals than in other hospitals. Fire-fighting activities in the two types of hospital are compared in Table 12.

Table 12: Fire fighting activity in relation to type of hospital

Fire fighting activity	TOTAL	Type of hospital	
		Mental	Other
TOTAL	684	292	392
Extinguished before the arrival of Fire Brigade	396	176	220
Tackled, but not extinguished before the arrival of fire brigade	160	72	88
No fire-fighting before the arrival of fire brigade	128	44	84

There does not appear to be any significant difference either in the success of pre-brigade fire-fighting or in the percentage tackled. However, comparison of the methods of extinction used before the arrival of the fire brigade (Table 13) shows that only half of the incidents tackled with extinguishers in mental hospitals are successful, whereas the proportion in other hospitals is about two thirds.

Table 13: Fire-fighting activity before the arrival of the fire brigade in relation to type of hospital

Pre-brigade activity	TOTAL			Type of hospital					
				Mental			Other		
Pre-brigade activity successful?	Total	Yes	No	Total	Yes	No	Total	Yes	No
TOTAL	556	396	160	248	176	72	308	220	88
Extinguishers	160	100	60	56	28	28	104	72	32
Water from buckets, immersion	112	92	20	60	56	4	52	36	16
Removal	40	32	8	8	8	-	32	24	8
Other small means not using water	92	80	12	32	28	4	60	52	8
Allowed to burn out	24	24	-	8	8	-	16	16	-
Combination of above methods	24	16	8	8	8	-	16	8	8
Inside hose reel or hydrant, more powerful methods	104	52	52	76	40	36	28	12	16

DISCUSSION AND CONCLUSIONS

Fires in hospitals have been increasing at about the same rate as all fires in buildings, rising from 590 in 1963 to 684 in 1968 (estimated from a 1-in-4 sample of reports).

Mental hospitals do not appear to be more fire-prone than other hospitals, although the types of fire which occur in them are different in some respects. They are more frequently in wards and less frequently in kitchens, and they are more often attributed to smoking materials and malicious ignition than in other hospitals.

Sixty-eight per cent of the fires in hospitals occur between 0900 and 2100 and 20 per cent between 2100 and 0300. The places where fires occur most frequently are wards (144), stores (80) and kitchens (76). Malicious ignition and smoking materials are the two most prominent causes of fires in wards and stores. Rules on smoking vary from hospital to hospital and it is possible that some of the fires in wards could be attributed to hospital visitors. There are few fires in operating theatres (the estimated frequency in 1968 was only eight).

Only 6½ per cent of fires in hospitals spread beyond the room of origin, compared with 28 per cent in all buildings. This can be attributed to prompt detection and fire-fighting activity before the arrival of the fire brigade. About 80 per cent of hospital fires are tackled before the arrival of the brigade and about 60 per cent of the fires reported are extinguished before the brigade arrives. It appears that water is more often used successfully than extinguishers. Internal hose reels are used on 15 per cent of fires, and on half of these occasions they are successful.

During the period 1963 - 1968 38 fires gave rise to 62 fatal casualties, 24 of these were in the Shelton Mental Hospital fire in which there was a delay in calling the fire brigade. During 1969, the problems of mental hospitals were again highlighted by the Carlton Hayes Hospital fire in which there were four deaths. Here, however, prompt evacuation saved many lives.

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