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THE DISPOSAL OF THE WOUNDED IN NAVAL WARFARE.

By Dr. PHILIP RANDALL (late Surgeon, R.N.)

Tuesday, May 12th, 1903.

Sir HENRY G. HOWSE (President of the Royal College of Surgeons)
in the Chair.

THE matter of the disposal of the wounded in naval engagements under modern conditions is one that has possibly from oversight, or more probably from its inherent difficulties, received but scant attention relatively to its importance.

There is a general consensus of naval opinion that a naval engagement under modern conditions would certainly be attended with much loss of life, and with a large number of severe injuries. This opinion has been amply justified by the experiences undergone by the combatants in the Chino-Japanese and the Spanish-American Wars.

Some attempts have recently been made to call attention to the subject, but there is an almost complete absence of all reference to the subject of dealing with the wounded in the works of all the leading authorities on modern naval warfare. It would appear, in fact, that the topic is considered to be a matter of very minor importance, or it is tacitly assumed that the means at the disposal of the Naval Medical Service for the due performance of their duties during, and after, an action, are so completely satisfactory, that nothing need be said about them; no matter from what point of view the writer may be dealing with the problem of sea-battles under existent conditions.

The importance of the subject, however, cannot be questioned from any point of view. The executive officers will find the presence on board of a large number of wounded to be a sore let and hindrance to the efficient working of a ship in any case in which they may haply find her after an action, whether, as regards her further usefulness as a fighting unit, supposing that the injuries received in action are not sufficient to interfere with her sea and battle-worthiness, or, on the other hand, if compelled by serious damage to struggle to the nearest port for repairs.

The medical officers view with much foreboding and positive dismay the prospect of being called upon to deal with a large number

of serious injuries, involving most probably in a large proportion of cases the performance of major operations, in such situations and under such conditions as are eminently unsuited for such purposes. Most especially does this apply to the after treatment of the cases, always important and of most critical moment.

Any consideration of the question leads to only one conclusion, which is that it will be impossible to do even bare justice to their work, however so well equipped they may be in professional attainments, and however so anxious to do their duty efficiently.

The sense of security that all will be well cannot, therefore, be justifiably entertained, and, as a matter of fact, no such feeling by any means exists among those whose work has lain in modern battle ships, or other ships of a class likely to be actively employed; neither among those whose duties are to carry out the primary and necessary purposes for which the ship of war exists, nor among those into whose hands are committed the due care and treatment of all who, by reason of injuries received, need their professional services.

The conditions of naval warfare have most profoundly changed since last our Navy was engaged in great wars. This, as regards ships and armaments, is a perfectly trite remark, but with respect to the accommodation for the wounded the equally great disparity that exists appears to have been passed over almost without notice.

Broadly stated, this difference consists in the fact that, whereas in the days of the old wooden line-of-battle ships the wounded were promptly, by means of the big open hatches, removed to the cock-pit, where they were out of reach of further harm from shot and ball, thus gaining comparative peace and safety so long as their ship remained afloat; nowadays, in no modern battle-ship, with the exception of the "Nile" and "Trafalgar," can this temporary security be obtained, while promptitude in "striking down" the wounded is no longer possible.

That canon of civilised warfare, which requires that no unnecessary suffering shall be caused in the process of crushing an enemy, would therefore seem to have been more amply met and carried out in the days of yore than can be possibly hoped for under the conditions now existing afloat.

The removal of the wounded is in itself of the greatest advantage to the survivors, who are thereby enabled to carry on with their duties free from the depressing effects and emotions, which are caused by the spectacle of friends and mess-mates sore-wounded and in great suffering. In all armies, arrangements exist for the prompt removal of the sick and wounded from the front.

The advantage claimed for the cock-pit of old is the only one that can be urged in its favour, being, moreover, one of a temporary nature only, for the advantage ceased when the action was over. In all other respects the place was as evil an one as could be imagined, for it was dark and noisome, with no ventilation, and soon became to those lying in it of most deadly effect, by reason of the many open wounds segregated there, especially under the then conditions of surgical treatment. The mortality among the wounded in those days reached an enormous figure, and the sufferings entailed upon all were terrible, both, however, being effects due to preventable causes in places other than such close, dark infernos. A return to

the cock-pit system will assuredly bring about most, if not all, of the same dire effects in all modern ships.

The sick-berth of the present day has gained light and air (but not in every case) at the cost of space, and of immunity from further injury for its inmates while the action lasts. The situation selected for it in all modern ships is thoroughly recognised to be one which would be absolutely untenable in actual warfare. For this reason, and with the further traditional object of procuring some sort of security for the wounded, another site is chosen somewhere in the ship, where a dressing station can be established which affords in some measure a hope of protection during battle. The station selected answers passably well for the purposes of the "General Quarters" of routine and of inspections, but in not a single instance would the position be even practicable in action, while for afterwards it would mean a return to the worst of the ancient evils.

It must be remembered, and the fact cannot be too strongly insisted upon, that the duties of the naval medical service are by no means at an end when the wounded have received such immediate treatment as may have been called for by the nature and extent of their injuries. The period of convalescence is one which at all times calls for constant and anxious attention, but more particularly after major operations, performed upon those who, at the time of their injury, sustained in consequence a profound shock to the whole system. Shock, *per se*, adds greatly to the difficulties present and the dangers to be apprehended in every case.

It is, moreover, absolutely essential in the light of modern surgical knowledge and experience that, to ensure a fair field for proper treatment, both at the time and afterwards, there must be a provision of such prime hygienic necessities as space, light, fresh air, warmth, comfort, and complete freedom from all septic dangers.

It has been by the evolution of, and the strictest attention to, all these details, that the modern triumphs of surgery have been achieved; without them the very best surgical skill will avail nothing of its ultimate object and proper office—the saving of life.

Before making any suggestions as to what might, or should, be done, it is necessary to institute as complete an inquiry as possible into the present state of the matter in question. There are three main headings into which the subject may be said to naturally divide itself. First to be considered are the means at present existing in ships for the accommodation of the wounded; next the state of things that will actually obtain and have to be dealt with during, and after, an action; and, finally, how far the present means will meet the actual needs.

In considering the means at present existing in ships for the accommodation of the wounded, the first point which seems most naturally to offer itself for attention is the position and capacity of the sick-bay provided in each ship, seeing that this is the only place in the ship devoted to, arranged and fitted out for the work of the Medical Staff. However, in all modern ships it has been found necessary to seek for a cock-pit for use in action, and a site is officially selected for such use. It is this place, therefore, that must needs be considered and not the sick-berth.

The reason for thus harking back to former methods will be easily understood after shortly passing in review the positions that

have been occupied by the sick-bay in the different types of ironclads, taken in chronological order from the earliest to the latest.

Type.	Date.	Position of Sick Berth.	Protection.	Accommodation.	Position of cock-pit.
Warrior (broadside)	1861	Lower dk. fwd. above W.-L. ...	nil.	4 cots.	not known.
Achilles (broadside)	1864	{ Lower dk. fwd. at W.-L. and ... Auxiliary, Main dk. fwd. ...	4½ ins. nil.	4 cots. 2 cots.	—
Bellerophon (broadside)	1866	Lower dk. fwd. at W.-L. ...	6 ins.	?	—
Minotaur (broadside)	1867	" "	5½ ins.	6 cots.	—
Hercules (C.B.)	1868	" "	6 ins.	8 cots, 16 hms.	—
Invincible (C.B.)	1869	" "	6 ins.	4 cots.	—
Monarch (turret)	1869	Main dk. fwd. above W.-L. ...	nil.	2 cots.	?
Sultan (C.B.)	1871	{ Lower dk. fwd. at W.-L. and ... Auxiliary, Main dk. aft. ...	6 ins. nil.	8 cots, 15 hms. 4 cots.	—
Devastation (turret)	1873	Main dk. aft. above W.-L. ...	nil.	4 cots, 6 hms.	?
Dreadnought (turret)	1875	{ Main dk. fwd. above W.-L. and ... Auxiliary Main dk. midships ...	nil. 11 ins.	5 cots. 8 cots.	{ —
Alexandra (C.B.)	1877	Main dk. amidships above W.-L.	nil.	3 cots.	?
Neptune (turret)	1878	Lower dk. fwd. above W.-L. ...	nil.	8 cots.	?
Nelson ...	1880	" "	nil.	4 cots, 7 hms.	{ Lower deck platform, aft.
Inflexible (turret)	1881	Upper dk. fwd. superstructure ...	nil.	4 cots, 8 hms.	{ Lower deck platform, aft. (4 cots).
Hero (turret)	1882	{ Upper deck superstructure { amidships... ..	nil.	2 cots.	{ Lower deck platform, aft.
Impérieuse (barbette)	1886	Upper dk. fwd. above W.-L. ...	nil.	8 cots, 6 hms.	{ Lower deck platform, aft.
Colossus (turret)	1886	Main dk. aft. superstructure ...	nil.	3 cots, 13 hms.	{ Lower deck platform, aft.
Collingwood (barbette)	1886	Main dk. fwd. above W.-L. ...	nil.	3 cots.	Lower deck.
Aurora (Arm. cruiser)	1887	" "	nil.	3 cots.	"
Sans Pareil (turret)	1887	{ Main dk. amidships, super- { structure	nil.	?	"
Nile (turret)	1890	Upper citadel fwd. above W.-L.	5 ins.	6 cots.	{ Lower citadel aft.
R. Sovereign (barbette)	1892	Main dk. fwd. above W.-L. ...	nil.	8 cots, 12 hms.	{ After bar- bette flat.
Centurion (barbette)	1893	" "	nil.	8 cots, 12 hms.	" "
Majestic (barbette)	1895	" "	nil.	8 cots, 16 hms.	" "

So far as concerns the subject under discussion, the "Majestic" type persists in all subsequent types of battle-ships, both as regards sick-berths and cock-pits, and the same general plan is carried out in cruisers, protected and armoured.

This table shows how, in the latest types, the sick-berth has quite passed from the protected position at, or below, the water-line, and behind the armour-belt, which it occupies in the broadside and central battery classes. In all other classes the sick-bay is placed in a situation which is completely exposed, so far as warfare is concerned, though infinitely preferable for use in the work of time of peace. The only modern ships having a protected sick-berth are the "Nile" and her sister-ship the "Trafalgar."

The upward progression of the sick-bay has been brought about by a force of circumstances, which, in the light of modern medical knowledge, is easily appreciated, when it is remembered how much importance is now known to attach to the supply of daylight and fresh air. Neither of these most necessary details could be obtained with either certainty or ease and freedom in places so buried in the depths

of the ship as were those assigned for medical purposes in the older types of battle-ships. The first instances of the effect of this upward pressure towards light and air can be seen in the provision of a "supplementary sick berth" in some of the early types of ships for use in peace time, on a deck well above the water-line. This supplementary berth has grown at the expense of the traditional water-line one, until the latter has, for some time past, been improved out of existence.

There can be no question as to the reality of the improvement that has been brought about from the point of view of the treatment of cases in time of peace, but, as has already been pointed out, it carries with it the disadvantage of an exposure so complete as to render it absolutely useless for the purposes of actual war.

The accommodation provided in the sick-bays never exceeds eight beds in any battle-ship, and there is, as a rule, swinging room for a dozen or more hammocks, sardine-fashion. The total accommodation, therefore, would not suffice for more than about twenty-four cases.

A return to the cock-pit principle has been decided upon officially for some time past, but, beyond the selection of a site, nothing further has been done to make the place selected in any way fit for its important duties, except the provision of an operating table (which is part of the carpenter's stores).

The question of the accessibility of the cock-pit from the fighting decks raises a practical difficulty which has always been present, and has become increasingly harder to compass in each new type. The features that so complicate the matter are due to the introduction, and the more and more extensive use, of water-tight compartments, with a corresponding increase in the number of the divisions and subdivisions of a ship by means of water-tight bulkheads. The use of armoured decks introduces a still further interposition of difficulties. When the ship is cleared for action, every opening in all these transverse, longitudinal, and horizontal partitions, is necessarily closed up, only such as form the means of communication between the magazines and the fighting stations being left open. "Striking down" the wounded to a dressing station improvised below the armoured deck has, therefore, become a matter of considerable difficulty, for the choice of position for such work is not only limited by special needs as to size of aperture necessary, but also by the finding of a hatch that can possibly be used for the purpose. A torpedo-hatch is usually selected as having sufficient size and probable freedom from other uses.

When the wounded have been brought down through a hatch to the flats, there still remains the necessity of finding a suitable place for their bestowing; but whether it be the barbette flats, the wing passages, or the bath-rooms for the engine-room ratings, the same serious objections apply to all. In not one of them is there any supply of air or light, other than by artificial means. The boiler and engine-rooms are in close proximity, keeping the places at a high temperature, and rendering the air close and stuffy even under the ordinary conditions of cruising, when all the boilers are not in use and every possible opening is kept free. Tightly closed down in action, with all the boilers alight, will mean a very considerable aggravation of already objectionable conditions.

It might, perhaps, be possible to accommodate about forty cases in these flats, but to do so they must be laid on the deck and packed closely together.

These then are the means at present provided for the disposal of the wounded, and the next point can now be considered, viz.: the state of things that will actually obtain and have to be dealt with during, and after, an action. In other words, it is necessary to determine as approximately as possible the number of wounded that will have to be dealt with as the result of an engagement.

As is the case with nearly all questions concerning the behaviour in action of modern ships, and their methods of offence and defence, not much information can be gathered, except a few details from the Chino-Japanese war. Practically nothing of advantage for this purpose can be garnered from the records of the Spanish-American war.

In order to arrive at some definite conclusion, the figures of some of the battles of the last great wars have been taken, and from them has been obtained a mean of the percentage loss by wounded to the effective strength engaged. A like average has been obtained for comparison from the figures officially published by the Japanese Government as the result of the battle of the Yalu River. From this comparison has been obtained what may be taken to serve as a working average. The comparison thus instituted between old and new is not so out of place and unfair, as might at first sight appear. The "wooden walls" were in reality walls of great solidity and thickness, amounting in fact to a wooden armour which, though proof against "long bows," was not so in close action; practically the same protective conditions may be said to exist in the armour of the present day.

Yalu has been taken for the modern side of the comparison, as modern arms and armour were there in use. Lissa may, in this respect, be said to be relegated to the period of ancient history.

The following table gives the actual figures of the great battles of former days, and the averages derived therefrom:—

Battle.	Nation.	Numbers engaged.	No. of wounded.	Percentage of wounded to total force.
Camperdown	Dutch ...	7,150	620	8·67
	British ...	8,221	622	7·56
1st of June	French ...	19,760	?	—
	British ...	16,647	858	5·16
Nile	French ...	9,820	?	—
	British ...	7,401	678	9·16
Trafalgar	Allies ...	21,580	?	—
	British ...	16,820	1,241	7·38
Mean of percentages		...	...	7·31

At Copenhagen 16 ships were engaged, with a loss in wounded of 688 by one account, 950 by another.

At St. Vincent 15 ships had a total loss by wounded of 227.

Losses in single ship and small squadron actions varied from 0 to 20 per cent. of force. The latter figure was attained in the action between the "Chesapeake" and "Shannon."

Losses of individual ships at Trafalgar varied from 0 ("Prince") to 27 ("Colossus") per cent. of complement.

The official returns of the losses by wounded by the Japanese Fleet at the battle of the Yalu River are:—

Ship.	Complement.	No. of wounded.	Wounded per cent. of complement.
1. Matsushima	360	76	21.11
2. Chiyoda	350	0	0.00
3. Itsukushima	360	18	5.00
4. Hashidate... ..	360	9	2.50
5. Hi-yei	308	37	12.01
6. Fusoo	386	12	3.11
7. Yoshino	?	11	?
8. Takachiho	365	2	0.54
9. Akitsusu	?	10	?
10. Naniwa	365	1	0.27
11. Akagi	113	17	15.04
12. Saikio	?	11	?
Mean of nine ships ...		7.39	

Of the total number of wounded, 204, there subsequently died on board, or in hospital, 32, or 25.68 per cent. These were distributed as follows:—

Matsushima	22	29 per cent. of wounded.
Itsukushima	1	5½ " "
Hi-yei	4	11 " "
Fusoo	3	25 " "
Yoshino	1	9 " "
Saikio	1	9 " "

It is stated in the Naval Intelligence report of the engagement that "early in the action the 'Hi-yei' was struck by a shell, which exploded in her ward-room. This was a part of the ship quite unprotected. A dressing station had nevertheless been established there, and both the medical officers were killed by the shell while at their work. All the wounded subsequently died."

The comparison yields a remarkably close result, and suggests a very notable agreement between the results of former days and the present time. It is to be remarked, however, that the Japanese must be credited with a much lighter rate than would have been the case had the gun practice of the Chinese been at all accurate, and their projectiles filled with a better ballistic than sawdust.

There are, therefore, strong grounds for the belief that, in an action in which there are highly-trained and skilful gunners on each contending side, the number of wounded will show no diminution on that obtaining in the old days, especially as all fire will now be concentrated upon the hulls, and not upon masts and sails, which latter were the primary object of our former foes.

A working average of seven per cent. of the complement, as the number of wounded to be expected in each ship in action, cannot therefore be said to err on the score of exaggeration, but must rather be looked upon as the irreducible minimum.

If this figure is taken as a working average, and applied to battle-ships, etc., now composing our main fleets, and certain to be actively

engaged in a naval war, an approximate number will be obtained of the wounded that will have to be treated in each ship that emerges from the contest. At the same time it must be borne in mind that this approximation may only represent a third, or even a fourth, of what may actually occur.

The line-of-battle in the Mediterranean Fleet is composed of the following ships:—

Ship.					Complement.	Wounded at 7 per cent.
1.	Bulwark...	...	...	...	750	52
2.	Cæsar ...	...	...	...	757	53
3.	Russell ...	...	...	...	750	52
4.	Formidable	...	...	...	750	52
5.	Venerable	...	...	...	750	52
6.	Illustrious	...	...	...	757	53
7.	Implacable	...	...	...	750	52
8.	Irresistible	...	...	...	750	52
9.	London ...	...	...	...	750	52
10.	Ramillies	...	...	...	712	50
11.	Renown ...	...	...	...	761	53
12.	Repulse ...	...	...	...	712	50
13.	Vengeance	...	...	...	750	52
14.	Victorious	...	...	...	757	53
Totals					10,459	728

The Channel Fleet has the following battle-ships:—

Ship.					Complement.	Wounded at 7 per cent.
1.	Hannibal	...	...	...	757	53
2.	Jupiter ...	...	...	...	757	53
3.	Magnificent	...	...	...	757	53
4.	Mars ...	...	...	...	757	53
5.	Majestic...	...	...	...	757	53
6.	Prince George	...	...	...	757	53
Totals					4,542	318

The Home Fleet battle-ships consist of:—

Ship.					Complement.	Wounded at 7 per cent.
1.	Revenge...	...	...	...	712	50
2.	Resolution	...	...	...	712	50
3.	Collingwood	...	...	...	460	32
4.	Benbow ...	...	...	...	525	37
5.	Anson ...	...	...	...	515	36
6.	Camperdown	...	...	...	515	36
7.	Sans Pareil	...	...	...	630	44
8.	Royal Sovereign	...	...	...	712	50
9.	Royal Oak	...	...	...	712	50
10.	Empress of India	...	...	...	712	50
Totals					6,205	435

The China Fleet has in line-of-battle:—

Ship.	Complement.	Wounded at 7 per cent.
1. Albion	750	52
2. Glory	750	52
3. Goliath	750	52
4. Ocean	750	52
Totals	3,000	208

To arrive at "Fleet totals," account must be taken of all ships likely to be present at an action in company with the battle-ships, although not in the line-of-battle. Cruiser actions also are far from unlikely to occur, and in these the 7 per cent. average is almost certain to be exceeded.

Taking the Fleets seriatim, the cruiser portion of the Mediterranean Fleet comprises: —

Ship.	Complement.	Wounded at 7 per cent.
1. Aboukir	700	49
2. Bacchante	700	49
3. Intrepid	273	19
4. Diana	437	31
5. Gladiator	480	34
6. Hermione	318	22
7. Dryad	120	8
8. Hussar	120	8
9. Naiad	273	19
10. Pandora	224	16
11. Pegasus	224	16
12. Scout	156	11
13. Speedy	85	6
14. Vindictive	480	34
15. Vulcan	433	30
16. Pioneer	224	16
17. Pyramus	224	16
Totals	5,471	384

Total wounded for the Mediterranean Fleet:—

Battle-ships	728
Cruisers	384
Total	1,112

The cruisers attached to the Channel Squadron are:—

Ship.	Complement.	Wounded at 7 per cent.
1. Doris	437	31
2. Furious	480	34
3. Hogue	700	49
4. Pactolus	224	16
5. Prometheus	224	16
6. Suttlej	700	49
Totals	2,765	195

In addition to these are the ships of the Cruiser Squadron:—

Ship.	Complement.	No. of Wounded at 7 per cent.
1. Brilliant	273	19
2. Hyacinth	450	32
3. Good Hope	700	49
4. Medusa	218	15
5. Minerva	437	31
6. Rainbow	273	19
7. Drake	700	49
8. Medea	218	15
Totals	3,269	229

The Reserve Fleet has the following cruising ships:—

Ship.	Complement.	Wounded at 7 per cent.
1. Bellona	169	12
2. Spanker	90	6
3. Onyx	85	6
4. Venus	437	31
5. Speedwell	90	6
6. Hebe	85	6
7. Severn	325	23
8. Apollo	273	19
9. Alarm	85	6
10. Gleaner	90	6
11. Melampus	273	19
12. Andromache	273	19
13. Reward	85	6
14. Antelope	85	6
15. Dido	437	31
16. Skipjack	90	6
Totals	2,972	208

The total wounded from Channel and Reserve Fleets amount to:—

Battle-ships—Channel	...	...	...	...	...	...	318
" Home	...	...	...	...	...	...	435
Cruisers—Channel	...	...	...	...	...	...	195
" Cruiser Squadron	...	...	...	...	...	...	229
" Reserve	...	...	...	...	...	...	208
Total	...	...	...	...	...	...	1,385

The cruisers in the China Fleet are:—

Ship.	Complement.	Wounded at 7 per cent.
1. Amphitrite	700	49
2. Thetis	273	19
3. Argonaut	700	49
4. Blenheim	590	41
5. Cressy	700	49
6. Eclipse	437	31
7. Pique	273	19
8. Talbot	437	31
9. Terrible	894	63
Totals	5,004	351

The wounded of the China Fleet would amount to:—

Battle-ships	...	...	...	...	...	...	208
Cruisers	...	...	...	...	...	...	351
Total	...	...	...	...	...	...	559

No account has been taken of the large number of torpedo-boat destroyers now in commission, and attached to the different fleets. Such of these as survive a general action, supposing them to be actively engaged, would have some wounded to swell the general totals.

Having now arrived at an estimation of the number of wounded that may be expected, the condition of the ship itself after an action may be considered.

The accounts published of the results to ships in the Chino-Japanese and in the Spanish-American wars, the opinions therefrom deduced and expressed by naval experts, and the views generally held as to what will be the most probable consequences of an action to ships, may all be shortly summed up as follows:—the unarmoured parts will be completely riddled by every sort of projectile, shot, shell and bullet, so that the internal arrangements of these parts will be in a state of complete and thorough disorganisation, due not only to the wreckage and destruction wrought by shell explosion, but also to the consequent outbreaks of fire; as regards the armoured parts of the ship it is at least doubtful whether the best protection yet devised

will remain intact, so that at any rate there can be no doubt about what will happen to parts where there is a less amount of protection by armour, whether in thickness or in quality of face. It is, in fact, laid down by more than one authority that, to escape as much as possible the far-reaching and devastating effects of shell, it will be better to have no protection at all than a moderate easily pierceable amount. Much the same disorganisation will therefore be found within the armoured parts as without, though maybe not to the same degree of destruction.

The ship's boats, if kept on board, will be found quite useless after an action, for, even if not destroyed and burnt by the enemy's fire, the concussion of the guns on board will shake them so much apart as to render them quite unfit for service. This was experienced in the fleet that bombarded Alexandria. It seems probable that in future no boats will be kept on board when going into action. This course was adopted by the Chinese after the experience gained in one of the first encounters of the war, that between the "Tsi-Yuen" and the "Yoshino," and it is said the French naval authorities have decided to follow the same line of action.

Two other points bearing directly on this part of the subject are, the accommodation provided in the naval hospitals, and the probable distances from these at which naval actions may occur. It is not possible, with regard to the latter point, to indulge in any speculations, except in works of fiction, but it may be of use, nevertheless, to note the distances at which the battles of old took place from the hospitals.

Haslar has accommodation for 1,013 patients; Plymouth for 700; Chatham for 828; and Haulbowline for 125.

Malta can accommodate 280 patients, and Gibraltar 119.

At Hong Kong there is accommodation for 71 patients, and at Yokohama for 96.

The battle of Camperdown was fought about 240 miles from Chatham, and 380 from Portsmouth. The battle of the 1st June took place about 550 miles from Plymouth and 660 from Portsmouth. Cape St. Vincent is 200 miles from Gibraltar, 850 from Plymouth, and 970 from Portsmouth.

Aboukir Bay is 825 miles from Malta, and 1,809 from Gibraltar. Copenhagen is 780 miles from Portsmouth.

Trafalgar is about 60 miles from Gibraltar, 1,000 from Plymouth, and 1,120 from Portsmouth.

We are now able to consider how far the means at present provided will go to meet the demands that will actually be made upon them. It will enable matters to be seen more clearly if the facts, as established, are actually applied to a ship like the "Majestic," as fairly representing the modern type of battle-ship.

The "Majestic" has a complement of 757. The sick berth has accommodation for 8 cases in cots, and 16 in hammocks. It is situated in the fore-end of the ship, just outside the armoured redoubt on the main deck. It is therefore not only unprotected from every sort of projectile, but is in a part of the ship which is certain, from the close neighbourhood of the fore barbette (containing one of the two pairs of heavy guns on board) to be a point upon which will be concentrated a continuous and heavy attack by the enemy's fire.

The cock-pit would be established in the lower deck flats, below the armoured deck, and inside the protected part of the ship. Either the barbette-flats, the wash-places, or the ammunition passages would

be selected. The sole means of communication between such places and the fighting decks would be devious and difficult; the only provision of light would be by artificial means, and probably only candles; while all means of ventilation would be cut off by the closing of the armoured deck, and the many bulkheads that exist. This last measure would be a vital necessity for the ship, but would make many times worse an atmosphere which, under ordinary conditions, is close, mephitic, and kept at a high temperature by the proximity of the boilers, all of which would be in use. The vitiation of the atmosphere of a closed space increases rapidly with each expiration from the lungs made by every person present therein, and each addition to the number of persons adds to the foul and poisonous condition.

The number of wounded to be expected, according to the average, will not be less than 53. When the ship emerges from action, with her unarmoured ends completely wrecked and disorganised; with her armoured parts in a somewhat similar condition; with numerous shot holes and rents in her sides, allowing seas to wash in freely, so that the decks and flats about the level of the water-line will be flooded with water; with, perchance, injuries from ramming or torpedo, which, by alteration of stability, or damages to engines and other vital parts, will only add to the general confusion; and with lighting and ventilating arrangements probably altogether unworkable, and completely broken down; how, and where, it may be asked, will it be possible to find a place, wherein at least 53 men with, in the majority of instances, severe wounds can receive, in even the least degree, that immediate care and attention, and especially the fitting after-treatment, which are necessary to save their lives?

The attempt to accommodate them in the flats can, and will, only mean a return to the disastrous effects of earlier days. The teachings of former experience have been writ large in naval, military, and civil practice, and the meaning of the writing on the wall cannot, nowadays, be possibly misunderstood or misconstrued. Consequences of terribly fatal effect will most certainly be entailed if, and whenever, fifty men—or for that matter half a dozen—are closely packed together on the wet deck of a heated, stuffy, place, never visited by daylight, having no natural supply of pure air, and with the artificial supply of both most probably cut off.

They would have to breathe an atmosphere thickly charged with respiratory products and human emanations. The blood about the deck, the clothing, the bedding, and dressings, would speedily become putrescent, and there would soon be poured forth, from the large wounds, a vast amount of putrescible discharge. In a medium so favourable to the production and rapid growth of many kinds of infective bacteria, erysipelas, tetanus, hospital-gangrene and all the fell products of septic infection would inevitably be developed; while all means would be powerless to avert their ravages. They would deal death far and wide among all cases of wounds, whether these were of large or insignificant dimensions.

The percentage of deaths amongst the wounded on board the "Matsushima" (29 per cent.) is, in these days of surgery, especially in the hands of the Japanese, an enormous one. It must be attributed to a very large extent to the crowding together of 76 wounded in a ship of her size.

Demonstration has now been made that the number of wounded will be large in every ship actively engaged; that the accommodation, at present provided in ships, will be insufficient for even a fourth of the number that may be expected; that this accommodation, being in the unarmoured part of the ship, will be impracticable for use during action; that it will be absolutely unfit for any use whatever afterwards; that it will be impossible to obtain elsewhere in the ship adequate and proper accommodation for the wounded; that the suggested cock-pits are in no wise suitable in size or in general conditions; that the use of so insanitary a place will infallibly bring about outbreaks of septic diseases of the most virulent kind; that no means of transport will be found on board available for use after action; and that the only hospitals large enough to receive the numbers consequent on a fleet action are at Portsmouth and Plymouth.

It is claimed that the evidence thus adduced and set forth can lead, after careful consideration, to but one conclusion. This is that in the fighting line afloat, as in the case in that ashore, all treatment of the wounded beyond "first aid" will be impracticable, and further, that after-treatment on board will, in justice to the wounded, be a practical impossibility.

A visit to any modern ship, in a spirit of enquiry as to the possibilities of adapting means to an end in this connection, will only serve to confirm the conclusion arrived at. It can then be most clearly recognised how completely the space inside the hull is taken up by what are absolute necessities for carrying out the real purposes for which the ship exists. This conclusion it is that effectually disposes of the suggestion that has been offered, and to some extent entertained, as a solution of the difficulty. The scheme is based upon the idea of putting the Medical Staff out of harm's way during the action, by immuring them in some place of safety below the armoured deck, releasing them when the battle is over—and if the ship remains afloat. If this course is adopted, the Medical Officers will be consigned to absolute idleness at the very time when their services are most urgently needed. One certain result will be the institution of what may be called "the law for the survival of the least injured," as only those with slight wounds will remain to be treated, *secundum artem*, on the release of the doctors from a durance, not only vile in itself, but also altogether opposed to the traditions and natural instincts of an honourable and self-respecting profession. The time taken over an action is expected to be short, but will in all probability not be less than three or four hours. In that space of time how many valuable lives may be lost, in fact, wasted and thrown away; if such a course as the above were to become the rule for the conduct of the Medical Staff in action!

The remark has often been made in the course of a discussion upon the topic, that a ship is no place for wounded men. This, though no solution of the difficulty, tersely but grimly sums up the whole truth of the matter.

There is, however, an obvious way out of the *impasse*, which is, to revert to a practice of years ago, when, as recorded in James' "Naval History," hospital-ships formed part of some of the large fleets sent out. What these were like, and what work they did, is not recorded; but it is easy in these days to have a very clear idea of what can be done, and, what is more, to completely carry it out.

The adoption of the principle of hospital-ships for fleets will be quite practicable in nearly every respect, and will go far to meet the

absolute needs and requirements that have been indicated, thus ensuring the saving of many lives which must otherwise be certainly wasted, and proving economical, not only immediately in respect to life, but also financially in the long run, as there will be saved for further use the services of many skilled and highly trained men, from among whom will necessarily come by far the greater proportion of wounded.

Every fleet of battle-ships should, therefore, have attached to it one or more ships entirely devoted to, and specially fitted out for, hospital duties, flying the Geneva Cross, and complying in all respects with the terms of the Geneva Convention and those of the Hague Conference.

These fleet hospitals will cruise with the fleets, and, having first received all cases of serious illness from the ships, will accompany them to the verge of safety when they go into action. Each hospital-ship must be provided with as many large and roomy boats as can possibly be carried. By means of these boats, endeavours can be made to maintain close communication with the fighting line, seizing upon every opportunity that offers, such as a ship hauling out of action, to collect and transfer to the hospital-ship as many wounded as possible. This may, or may not, be practicable, but the main use will be when the action is over. The hospitals will then close with the fleet and their boats will bring away all the wounded from every ship in the fleet. By these means the ships of the line will be freed from the encumbrance and hampering due to the presence of wounded on board, and will be left with crews necessarily diminished in numbers, but composed of those fit and able to devote their whole attention to their own proper duties.

The benefits accruing to the wounded will be incalculable, for, once received on board the hospital-ship, their treatment can be carried out, each and every case in proper detail, and according to needs, quite free from difficulties which otherwise would be overwhelming. At the same time excellent conditions for the due and proper after-treatment of the cases will be completely ensured.

The movements of the hospital-ship subsequent to the action would necessarily be governed by circumstances, but, whether despatched to the nearest available hospital or remaining at sea with the fleet, those on board will be under conditions offering the best means of recovery, and vastly different to a labouring and probably long-drawn-out voyage in a much be-damaged battle-ship, possibly unable to effect more than a few knots of speed.

Under these conditions the services of the Medical Staff would have to be disposed in three ways, in the fighting line, in the collecting boats, and in the hospital-ships.

In the fighting line only "first aid" should be rendered to the wounded, and for this purpose dressing stations should be established where possible and convenient. One medical officer in each ship would be sufficient for the supervision of this work, and his sick-berth staff should be reinforced by the chaplain and accountant staff, for all of whom thorough instruction and examination in these duties should be made compulsory. The medical officer and his staff of assistants must be free to move about the ship as expeditiously as they can, and to wherever they are most urgently needed, as, for instance, to a casemate wrecked by a shell. A central dressing station would naturally be of the greatest assistance, but it must be regretfully admitted that

very little can be hoped for in this direction, in view of the very complicated arrangements of modern ships of war.

The introduction and general use of casemates for the guns of the secondary batteries suggests that these may, in some way, act as a screen for dressing stations established in rear of them. The deck would be clear, communication would be easy, and the wounded would be most conveniently placed for removal to boats whenever a suitable opportunity presented itself. The "striking down" difficulty would thus be completely avoided, and there would be a great gain in promptitude of attention by the Medical Staff.

The collecting boats should be steamboats of good and handy sea qualities, as large and roomy as possible, and accommodating six or eight cot cases. They must be manned by crews well skilled in boat work, as well as in the hoisting-in and -out of cot cases. Not less than twelve of these boats should be carried by each hospital-ship.

The type of ship most appropriate for the purpose of a hospital-ship is one on the general plan of a modern mail steamer of the best class, of good size, and capable of maintaining a continuous sea speed of not less than 18 to 20 knots, so as to keep station with a modern fleet proceeding at full speed. The wards should occupy the centre and forward parts of the ship, where nowadays is placed the first-class accommodation in mail steamers, thus ensuring a liberal supply of fresh air, light, and deck space. It would be well to limit the accommodation of each ship to 500 cases, so as not to involve too large a staff, and consequent difficulties in finding sufficient room for their due requirements and convenience.

The ships should be specially built for the purpose, and not adapted from existing mail-steamers, so as to ensure complete protection from septic dangers. *Mutatis mutandis*, all the details, large and minute, now introduced into modern hospitals with the object of limiting, as far as possible, resting places for dirt of every description, should be carried out in the ships so as to obtain damp and germ-proof floors, walls, and fittings throughout. In a word, the hospital afloat must be built in every respect in accordance with the principles adopted in the hospital ashore, and must be as perfectly self-contained in every respect.

With a ship thus equipped for the purposes of active service, and by strict attention to all other details besides those briefly alluded to, which ensure complete asepsis, it will be possible to remove completely the stigma formerly attached to hospital-ships, which have been used in connection with military operations from a sea-board base.

The wounded will be able to do as well as if treated in well-appointed hospitals on shore, moreover they will not be taking up room which, if found, can be ill-spared and is wholly unsuitable; they will not be in the midst of extremely insanitary conditions which cause them great distress, and are of actual deadly effect; they will no longer be exposed in a helpless and hopeless position to fresh wounds in any further action; but they will have every possible means known to modern science afforded them of remaining to prove of further use to themselves and to their country.

A profitable use can be found for such ships in time of peace. Part of the year could be devoted to cruising with their respective fleets, carrying out manœuvres which should embrace all the details for active service, thereby ensuring proper training and efficiency.

For the remainder of the year they could be used for the conveyance home of invalids *only* from India and other foreign stations at the cost and charges of the respective military authorities. A special service in this respect would be a great boon to all concerned, and has long been needed.

The CHAIRMAN (Sir Henry G. Howse, President of the Royal College of Surgeons):—A discussion is the usual thing, I understand, after a paper of this kind: and I should like to invite any remarks from any of you upon this subject. Individually I must confess that I feel very much obliged to Dr. Randall for presenting to us this paper, because the subject is one which we must all admit to be of very great importance not only to medical officers (to whom perhaps it is of the greatest interest), but also to all the staff and to the crews on board a ship, because the wounded will be amongst them all, and the proper treatment of the wounded must necessarily be of interest to everybody concerned on board ship. Then again I think that this is a very appropriate time for a discussion upon such a subject. We are at peace but we'll remember acutely (medical officers especially) what took place in the last war—I do not mean the last naval war; I mean the war in South Africa. We remember the odium that was heaped upon the medical officers on account of the great outbreak of typhoid, because it was said insufficient precautions were taken against it. Now if we just apply that to the care of the wounded in naval warfare, and if we think this picture which Dr. Randall has drawn of the condition of the wounded on board ship to be an accurate forecast of what we shall see in future naval actions, then unless the Service is well prepared beforehand by consideration of the very best treatment under the conditions of the wounded, can we not fancy what an outbreak of public resentment and public opinion there will be if it is found that there are such conditions prevailing on board our ships as absolutely preclude the proper treatment of wounds? Clearly the subject is one of very great difficulty. It is quite clear that the treatment of wounds on board our great armoured battle-ships is one that will be extremely difficult under any circumstances. The whole subject should certainly be very carefully considered in the first place, so that we may be in the highest degree fortified by the previous consideration which has been devoted to the means for the best treatment of the wounded. The suggestion that is contained in this paper of hospital ships seems to be one of very great importance. I do not want to say more—there is no time for it—but I hope that some of you will express your own opinions.

Admiral Sir N. BOWDEN-SMITH, K.C.B.:—The care and disposal of the wounded on board ship in time of action is a difficult question, for, as the lecturer says, in peace time the sick berth must be in some portion of the ship where the men who are ill can have light and air. In my opinion the only solution is that those responsible for the arrangements in each class of ship must arrange a place where the wounded will be least open to damage from wreckage by shell fire and where they will least interfere with those combatants who are carrying on the action; for there is one thing in a battle that is after all more important than the care of the wounded, and that is winning the action. As regards the question of hospital ships, I fancy (although not behind the scenes) that the question has been thoroughly considered by the Admiralty, and I have no doubt they have got their eye on several vessels on their lists, which would be taken up in the event of a war,

or on the probability of a war, and quickly converted into hospital ships. It would not take long to convert an ordinary passenger steamer into a hospital ship. They are well arranged for carrying a large number of passengers; they have cabins, saloons, and large deck spaces, and are well fitted with awnings. They have also baths and every convenience for carrying fresh food and ice. But I protest against employing several hospital ships in peace time. It is not necessary to have one cruising with our fleets in peace time because we have now a hospital on every station. If you have a number of hospital ships attached to the fleet in peace time it would very considerably increase the present heavy estimates. During the time that I was serving I used to think it more humane, more convenient, and certainly more economical, on a foreign station, to hold a medical survey on anyone seriously ill and to send invalids home by the first passenger steamer homeward bound. I do not think it would be a wise arrangement to keep batches of invalids waiting at a port until one of these hospital ships was ready to go and collect them. If they should be too ill to be moved in an ordinary ship, these are on almost every station hospitals of some kind, if not our own, where sick men who are not able to take a long voyage could be sent until able to travel. Of course fitted hospital ships would be necessary in war time, but the wounded would not be many days on board. Immediately after a battle the hospital ship with her Geneva flag flying and painted appropriately would draw near to her fleet, and would receive the wounded from the fighting ships, but it would be unwise and improper for such a hospital ship to come near the fleet or to try to communicate with any ship while the action was in progress, unless of course a vessel had struck or was manifestly sinking, in which case I presume International Law would permit the hospital-ship to rescue the crew. If she attempted to communicate with any ship during the action she would run the risk of being roughly handled by the enemy. As regards boats, I do not think it would be practicable or even necessary to have 12 steam boats to each hospital ship as the lecturer proposes. If you had steam boats sufficiently large to carry the wounded comfortably, I should think each boat would weigh 8 or 9 tons; and steamers could not carry them or anything like it. There is no doubt as the lecturer says, that after an action the boats of fighting ships would all be destroyed, or if not destroyed by shot and shell they would be so unseaworthy from the concussion that they would not float; therefore it would be necessary for the hospital ship to be well supplied with boats, and to have some steamboats, I should say a couple of good steam boats for towing would be all that was necessary. I offer these criticisms in a thoroughly friendly spirit, and as a member of the Council of this Institution beg to thank the lecturer for bringing this subject before us. I regret that there is such a small attendance, but the paper with his interesting statistics as to the wounded in various naval battles will be published in the JOURNAL, and I feel sure will be widely read by our members all over the world.

Fleet-Surgeon J. LLOYD THOMAS, R.N. (H.M.S. "Excellent");—I have not had the privilege of reading the paper beforehand, and therefore I have not had any opportunity of sketching any outline of it; but as an old messmate of Dr. Randall it has given me the greatest pleasure to listen to all that he had to tell us. It is a most elaborate work that he has presented to us; but I fail personally to see that he has told anything particularly new as to the disposal of the wounded in action on board a man-of-war. He has given us a most gruesome and wonderful picture of the effects of a naval battle, so striking that I wonder if ever again any doctor

will join the Navy under those conditions. However, a man-of-war is a man-of-war, and, as the Americans say, I do not think anyone goes on board "for the benefit of his health." But I cannot conceive why Dr. Randall should take the extraordinary picture of the battle of the Yula (between the Chinese and the Japanese), and compare it with anything that is likely to happen again. Now I will try to tell you why. I would divide our ships into two sets—the big ships and the smaller ships; that is the name I give, as a doctor, to *A*, our battle-ships; and *B*, cruisers and gun-boats. I think it will be remembered that the Japanese, in those waters, had nothing but cruisers, and two-thirds of them were absolutely old-fashioned; the Chinese, on the other hand, had two battle-ships. The Chinese record of death was greater than the Japanese because of the better shooting and the quick-firing guns used by the Japs and the demoralised state of the Chinese sailors—not being under cover, etc., as well as being in inordinate numbers. The figures do not appear, I think, in the tables on the paper. I am inclined to think that Dr. Randall's $7\frac{1}{2}$ per cent. of deaths, in view of the information we have derived from the Chino-Japanese war, is rather misleading. One ship in particular I had the privilege of inspecting the day after the Yalu, the "Hi-Yei." There the death rate was enormous; the ward-room had been blown away, as Dr. Randall stated, with the surgeon of the ship and all those who were intended to dress the wounded; and, without a doctor, the wretched ship (a perfectly lame duck) had to make her best way to Japan, and all the wounded died on the way. There were not attendants, the bleeding patients were not looked after; therefore that augmented the percentage of the $7\frac{1}{2}$ enormously. In another case there was a surgeon killed on board one of the Japanese ships—I forgot which ship it was. I submit that that would also increase the percentage of deaths as in the case of the "Hi-Yei." However, I will come to the point of the treatment of the wounded in action, or rather their disposal, if I may venture to do so, having spoken to a good many of my *confrères* in Portsmouth and at different times consulted others. I will submit very briefly my views as to what should be done in action, having regard to the type of wound or accident resulting from the hideous weapons that we are now using. I will take very briefly as an instance what would happen on board of a man-of-war. The first thing to follow the impact of a shell would be its explosion resulting in a violent shower of shell fragments in every direction, and the sudden and large development of gases. That I take it is what the doctor has to think about when considering his wounded men inside the casemates. I had hoped that Dr. Randall would have told us something new in such circumstances. What would he have us do with wounded men in action? During the past five years, a very great deal has been written on the subject, but it has always come to the same thing—"we really cannot say." That, to the best of my knowledge, if you will allow me to say so, is very much what the Spanish-American war taught us. As to the disposal of the wounded, if I may venture an opinion, and the opinion of many others—although some are quite opposed to it—I think that the removal of the wounded, be he ever so lightly wounded, is a very dangerous performance. I feel that if the explosion occurs in a casemate, or if it occurs on deck—there are not likely to be many on deck for amusement, you know—those in the casemates are the safer men in spite of the confined space and condensation of gases. Should there be any man injured, I submit that he should remain on the spot, and take his chance in this big machine for fighting until the doctor or his assistant comes and decides whether he should or should not be removed, during a lull or after the action is over. The sailor is quite prepared to take his

chances, I think, whatever they may be, whilst on board. There is a great danger in moving these men about in the present modern men-of-war in order to take them below what we call the protective deck, where he is, as near as may be, absolutely secure, having the water outside and the steel of the deck above. As to shooting them below through extraordinary holes and hoists, only the very few of those who know anything about it have any conception what it means. Half the time a man must be shot down upright and in a perpendicular position. Further, there will not be in time of war, as I understand it, any open spaces other than those inside the casemates or fighting boxes, and these are shot hoists, and it would be very difficult to lower the men down through them without interfering with the fighting efficiency of the man-of-war; and I take it, that the surgeon's duty must never be allowed to affect the fighting efficiency of the ship—we must fight and maim, and mend if may be afterwards.

Rear-Admiral H. J. MAY, C.B. (Captain of the Royal Naval College, Greenwich):—We all agree that we owe a vote of thanks to Dr. Randall for coming here and addressing the Institution upon a subject upon which I scarcely remember a paper for very many years. One reason for that is perfectly apparent when one looks at this paper with a view to criticism. A man who reads a paper on a subject like this requires not only to be a skilled surgeon, but he requires to be an able strategist and tactician, a gunnery man, and I do not know how many other things. You cannot decide what is going to happen after an action, unless you know where and when and how the action is going to take place, and what is going to happen to your crew on board, unless you understand thoroughly the protection of a ship and the attack which will be made upon the men who are under that protection. I will remind the meeting of what probably many know perfectly well, that the modern ship consists first and foremost of the under-water part, which is belted round in a battle-ship, but is always decked over whether in a battle-ship or in a cruiser. When the under-water part of a ship is being designed and constructed, every department fights for space and weight—the engineers want space for their main engines, the gunnery officers want space for their magazines, the torpedo officers want space for their torpedoes, stores require much space, and everyone who wants power to do his work wants space for the engines and machinery to provide that power. The result is, that all the under-water part of the ship is very much congested, and it is extremely difficult to find any space there for either doctors or wounded. But when we look into history, when we look back to our forefathers, who were not squeamish men but who were most courageous, we find that in action there was a most earnest desire both on the part of the men who remained intact and on the part of the wounded themselves, to get every man who was hit below out of fire. They were got down into the cockpit, a horrible place, which has been so well described to us, but though it was horrible, it was safe. So there is in the present day, the same sort of earnest desire to get the wounded down to safety under the armoured deck. But when we try to do it, we find it is most difficult if not impossible. When a ship is prepared for action, the one idea is to have but few hatches in the armoured deck so as to keep her afloat, and the design of a ship is arranged so as to give the men who are fighting the guns as much protection from harm as is possible, without exceeding some moderate amount of weight devoted to armour. The result is that the modern turret or casemate is made as small as possible, and it has the smallest possible communication with the armoured deck below, that communication

being made just big enough to bring up the ammunition, while outside the turret or casemate all is unarmoured. Thus most of the men will be behind armour and absolutely cut off from getting below except down the very small tube that brings up the ammunition. A man with all his senses about him and a bit of a gymnast will find it very difficult to get down that tube, and if he is wounded it will be out of the question. Now, what has been suggested by Dr. Randall? He suggests that some spaces should be found between or in rear of the casemates but outside them, where dressing stations might be established. Any officer who has seen one of the ships that have recently been made targets of, and remembers what happened outside the turrets or casemates of those ships, would see what that proposal is worth. It is an absolutely hopeless thing. The blast of a shell takes everything movable outside the casemate, and would throw the whole thing into a great heap. You would have rags of wounded men, you would have little pieces of a doctor, and you would have all the fittings, instruments, and dressings mixed up in one heterogeneous pile. That would do nobody any good. You cannot have a dressing station under those conditions. The only thing, as Dr. Lloyd Thomas has said, that is at all practicable is, that the men must remain where they are, behind the armour near the guns, and there they must be treated by those who have been instructed in first aid. We must keep our doctor safe as far as possible, so as to have him at the end of the action. The captain will decide what is the safest place to put him in; but the doctor will have instructed a percentage of the petty officers or other intelligent men how to help temporarily the men wounded at the guns, and after the action they will have to be removed to the best place available—possibly into a hospital ship, possibly to some other ship that is not much knocked about—some cruiser that has not been in the action; but during the action I can see no way of removing the wounded with any possibility of safety—they will have to be treated at the guns themselves.

Staff-Surgeon ARTHUR GASKELL, F.R.C.S., R.N. :—It seems to me, that, as Dr. Lloyd Thomas has said, the lecturer has not brought out anything very new. I think we have all of us recognised for years past how much use hospital ships would be. I have studied the subject lately a good deal, and I have come to the conclusion that a hospital ship should not be a converted ship, but should be a ship absolutely built for that purpose. My reason for saying so is that I have tried to plan out how a ship that has been built for other purposes could be converted into a hospital ship, and I have found that it practically came to pulling everything out of the inside of the ship, cutting large windows in the side of the ship so as to let in more light and air, and then building, as it were, a hospital inside that shell. Having to do all that, one would think that possibly it would be simpler to start by building that shell into more of a shape which would approach the shape of the wards that you wish to have. As regards treating the wounded after an action, it seems to me that that idea of "striking them down" on boards or stretchers, or in canvas buckets, as we have all of us tried to do so often in General Quarters, is absolutely a farce. It always gives one the impression of being a sort of pretence at being busy; but every thinking doctor who has gone through this clownish pantomime must have always felt that he would never dream of doing it if he were actually in action. I think the majority of doctors in the Navy have come to the conclusion that when the action is being fought the men must lie where they fall. I do not like the idea of locking up the doctor down below. I think you might have a few extra doctors in hospital ships

who could be sent to the ship after the action, but the doctor on board the ship most certainly ought to be running all about the upper deck, and the fighting parts of the ship, putting on tourniquets and temporary dressings. His work would chiefly be putting on tourniquets. One last suggestion I should like to make is that the staff of the doctor should not consist purely and simply of the chaplain and accountants who are so often made out to be his sole assistants. I think every man, or certainly every petty officer, on board ought to be compulsorily taught first aid to the wounded, and then he, as the captain of the gun or whatever he might be, would be able to put a tourniquet on a mate, or on himself, if necessary. In China, when the wounded were brought down to the hospital where I was serving, I asked them various questions about what they did when they were wounded, and what they felt like, and so on, and the thing that struck me was that actually the first dressing put on was often their own puggaree, which was put on by themselves. Then along would come the doctor, who would apply some better dressing and put the man on a stretcher and have him carried out of action. It seems to me that the wounded man, whether it is in army fighting or in navy fighting, will very likely have to attend to himself in the first moments.

Staff-Surgeon W. A. WHITELEGGE, B.A., M.D., R.N.:—I have listened with very much pleasure and with the deepest interest to Dr. Randall's lecture and also to the very able and eloquent discussion to which it has led. I beg to add my remarks and to confirm the opinions of Fleet-Surgeon Lloyd Thomas and Staff-Surgeon Gaskell, in reference to the treatment of the wounded immediately after an action. I have never been in an action at sea, and I hope I never shall—I am not sighing for that experience; but the picture that has been depicted by Dr. Randall in his lecture is certainly one to give one the creeps, as we may say. However, I hope it will not be as bad as he has made it out with the wounded, the dying, and the living being covered with gore. During the action, to leave the men as they fall seems and sounds inhuman, but I think it ought to be impressed on every man, from the officers downwards, that they should know how to apply tourniquets and how to stop hæmorrhage in the first instance. A great deal can be done in this way if any medical officer chooses himself to take up the post of instructor to his men. I have done it with the greatest success. I do not say that the men are actually doctors, but I certainly say that those who have been through the instruction know how to put on a tourniquet properly, and the greatest possible benefit, I am sure, will accrue from that in time of action. As regards hospital ships, the Admiralty have, I believe, taken this point a great deal into consideration. We have got the hospital ship "Maine," and I believe she is giving a very great deal of satisfaction in the Mediterranean. I think that even in time of peace it would be an advantage to have a special hospital ship attached to each fleet—not to have one hurriedly commissioned at the time of war, which would be very awkward, because then there would be all the fitting out necessary, and the appliances to be gathered at the last moment—not to mention other details which are essential to a properly equipped hospital ship.

Dr. RANDALL, in reply, said:—One thing I am bound to confess is, that as my old friends Dr. Lloyd Thomas and Dr. Gaskell said, there is nothing new about my paper. I may say that it is seven years ago now since I first drafted the paper out, and it is nearly seven years since I first

suggested reading it at this Institution, but it is not until now that I have been free to do so. I am quite well aware that there is nothing new **at all** in the idea; but at the same time it is not perhaps untimely to bring it forward just now. In the December (1902) number of the *JOURNAL* of this Institution there is a translation by a distinguished naval medical officer of a long paper, by one of the chief surgeons in the French Navy, in which the author distinctly goes back and strongly recommends the disposing of the wounded below the armoured deck. I think that it would be absolutely criminal to put wounded men down below the armoured deck. Admiral May, in what he said about the building of ships, told us how everybody is fighting for space below the armoured deck—so they are—everybody except the doctor. He gets no chance at all, and is not thought about; yet they want to shut him down there in passages and places where no one else wants to go. As regards my unfortunate suggestion as to the use of casemates, my idea was simply and solely that as the casemates of the secondary battery are the only armoured parts of that portion of the ship, they might in some small measure act as a sort of screen, so that you might have behind each casemate a small dressing station. The medical officer, I think, must take his chance and be free to move about. Take the case of wounds of large blood-vessels. It is then a question of moments, it's not a question of waiting for a few hours till the action is over. As to the unfortunate sailor, like everybody else on board the ship he must take his chance; but whatever can be done to give him when wounded some screen, the armour of the casemate, for instance, would be a very great advantage, for you would have the man on the upper deck and not below, and you would thus be able to get him quickly out of the ship when chance offered. There was one suggestion I forgot to notice in the paper. This was one made by Mr. Wilson in his work on "Ironclads in Action." He refers there to the subject of what to do with the wounded, and recognises the enormous difficulties there are in dealing with them. It occurred to him that every man ought to go into action with a life belt on, and that when he is wounded he should be dropped overboard: If I were wounded in a ship, I would much sooner be dropped overboard than go below the armoured deck. At all events the sea water is clean, and will keep the wounds clean; a man would, therefore, get a better chance in every way, for when the boats were about he would be picked up and taken to the hospital ship, but if he were below the armoured deck lying helpless in one of the wing passages or the barbette flats, he would be like a rat in a trap, if the ship went down. I had not time to refer to it—the paper was already too long—but it is a very important point that the crew should have thorough instruction in first aid, the captains of guns and their men especially. This instruction must be made compulsory. The use of hospital ships for conveyance of invalids was intended to apply to military invalids who at present have to travel in troop-ships. I thank you all for your very kind remarks with regard to the paper.

The CHAIRMAN (Sir Henry G. Howse, President of the Royal College of Surgeons):—In the first place as regards the character of the wounds and the picture which has been drawn of a ship after a naval action, I am afraid it is in no way exaggerated by the writer of the paper; even Dr. Lloyd Thomas himself, I think you will agree with me, drew as lurid a picture as ever the reader of the paper did. I am of course a landsman and I know nothing about naval affairs, but when you remember the character of the wounds which will be caused in naval actions in the future, I think you will say that Dr. Randall has not exaggerated. When

you remember the character of shell wounds—the horrible lacerations which they produce—ininitely worse than any rifle fire, infinitely worse than any wounds inflicted with the bayonet or the sword—you will realise that the character of the wounds in naval actions will be of the same kind. A shell strikes a ship's plate, there is metal flying about, and the character of the wounds will be lacerations cruel and horrible. I do not think that in any way the lurid picture which has been drawn of the results of these actions has been over-stated; and I should be inclined to agree with those who say that during a naval action, the wounded will have to lie where they fall, and that anything that can be done for them must be done simply by the aid of those around them. The importance of the suggestion that everybody on board ship should be trained in first aid is not in the slightest degree over-stated. I think it ought to be a cardinal point in the future in the training of all the men; it is a part of their own interests, sailors and marines alike, that they should be trained in the principles of first aid. That the sailors have a great deal to do is true; but the sailor is a handy man, and he is a very quick man, and apt to learn, and he will very soon acquire the necessary information and the necessary manipulations—and they are very few—simple tourniquets are perhaps some of the most important, and the firm bandaging of the wounds so as to prevent hæmorrhage. What you want is to prevent the wounded man dying straight off, before a doctor can attend to him after the action is over; and such means can be very readily learnt, I am sure, by the crew of a vessel. It is impossible for the doctor to be running about attending to all the wounded, and therefore without this first aid many of the wounded must die before the doctor reaches them. With regard to the suggestion of a hospital ship, I feel quite certain myself that that is a right suggestion, but I am not quite so certain that the idea of converting the Atlantic liners and similar vessels for hospital purposes will be so advantageous as has been thought. As Dr. Gaskell mentioned, when you come to convert one of these vessels into a good hospital ship, you may have to effect most immense alterations in her. However, it might be tried, and I suppose it has already been partly carried out. It seems to me that there should be one or two model hospital ships constructed with hygienic arrangements suitable for operations and for the treatment of the wounded after a battle; and that they should serve as types subsequently for the construction of other ships, and for the alteration of cruisers or of Atlantic liners. A good deal would be learnt at least in that way if some such ships were constructed. Then we must recollect also that the suggestion of hospital ships must be an *addition* under any circumstances to the requirements necessary for the treatment of the wounded at the present time. The paper leaves out of account altogether the fact that there will be duels between ships in the future just as there have been in the past, and you cannot have a hospital ship accompanying every cruiser or every line-of-battle ship that goes out. Therefore there must be arrangements made in each individual ship for the treatment of the wounded. Still that it would be an advantage to have a model hospital ship constructed I feel no doubt about at all. I am speaking, of course, as one utterly inexperienced, and I feel an apology is due to you for my occupying the Chair on the present occasion. I am a landsman of landsmen, and I think you may laugh at me for venturing to say anything about this. Still, I know something about wounds, although I do not know much about the construction of ships, and I cannot help feeling very grateful to Dr. Randall and to all of you who have come here this afternoon, and expressed your opinions as you have done. I am sure the discussion has been a really very much better discussion than the meeting has been a meeting as regards

numbers. I congratulate you all, and I am very glad indeed to have had the honour of presiding on this occasion.

Admiral Lord Charles Scott, G.C.B. :—I beg to propose a vote of thanks to Sir Henry Howse for presiding to-day. It is a great honour to us, I think, that so distinguished a man as the President of the Royal College of Surgeons should find time among the many pressing engagements that he must have, to come and preside over a meeting of this Institution; and we are all deeply indebted to him for doing so this afternoon. I am sure that when he talks about his ignorance of naval matters, many of us could hardly believe it from the way in which he spoke upon the subject before us to-day. He spoke on it as clearly and distinctly as any naval medical officer could have done. The details of ships are beyond many people—even naval architects sometimes fail in their architecture—and so I am sure if a medical man pleads that he does not know all the details of the building of a ship, he is in very good company indeed.