could abolish decerebrate rigidity by interrupting the connexions of the skin receptors. Responses evoked by sternal stimuli cannot be elicited from any other area of the skin, which suggests that sensory receptors in the midline of the sternal area play a special part in the elicitation of decerebrate responses.

Summary

A new sternal reflex, elicitable in states of organic cerebral damage with somnolence or coma, is described.

The special susceptibility of the sternal region, due to ontogenetic and phylogenetic factors, is discussed. Pain stimuli applied to the manubrial area evoke defence reactions (motor and autonomic) which are impaired or absent on the side of the paresis or paralysis. In lesions affecting the brain-stem decerebrate reactions are observed.

Brief illustrative case histories are given.

I wish to express my gratitude to Professor M. Minkowski (Zurich) for showing so much interest in my work and for his positive evaluation of it, and to Professor E. Czarnecki, Director of the Physiological Institute of the Medical Academy in Poznan, Poland.

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POST-OPERATIVE INFECTION IN A CASUALTY DEPARTMENT

BY

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Casualty departments have often been criticized. Clarkson (1956), for example, stated that in his opinion current arrangements in casualty departments throughout the country were the biggest single defect in the Health Service. The recent report of the Nuffield Provincial Hospitals Trust (1960), based on twenty casualty departments serving a population of over five million people, concluded that there was a need for leadership and urgent executive action on the part of the hospital authorities to review, reorganize, and improve the service for casualties.

Many out-patients come to a casualty department for the treatment of wounds or for minor surgical operations. In either instance there is a risk of wound infection which entails discomfort or perhaps danger to the patient and delay in discharge. This subsequent wound sepsis may arise in several ways. It may be due to an extraneous infection introduced pre-operatively in laceration cases, to infection with the patient's own organisms, to cross-infection occurring in the operating theatre, or to post-operative contamination of the wound.

In recent years the investigation of sepsis occurring in hospital has led to modification in ward and operating-theatre practice and design. By contrast the occurrence of sepsis in out-patient departments has not been the subject of such detailed study, although a clearer understanding of the way in which it is caused would be valuable in planning new departments and in modernizing old ones. Several questions need to be answered. For example, there is uncertainty about the danger incurred in treating clean and septic patients in a single operating-theatre.

In this hospital one theatre is used for the surgical treatment of all casualty patients, both clean and septic (other than those attending special departments). We here describe an investigation which relates primarily to 362 clean patients and which has been designed to see if wound infection in the latter could be traced to the coincidental treatment of patients with septic lesions.

Methods

Operating-theatre.—This was a room of 575 sq. ft. (53.5 sq. m.) containing three operating-tables. Instruments were sterilized by boiling. The theatre was ventilated by three small extractor fans. At any one time the nursing staff consisted of a sister and a nurse; the surgical staff was drawn from registrars, house-surgeons, and students. For every patient the operator scrubbed up and wore a gown and a mask: gloves were worn for some clean cases and for all septic cases.

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Cetrimide and 1/2,000 proflavine hemisulphate were used for skin- and wound-cleansing. After operation dry gauze or "tulle gras" dressings were applied according to circumstances.

Patients.—Clean patients—that is, those with fresh lacerations to be sutured, or with cysts, lipomata, etc., requiring minor surgery—were operated upon under local anaesthesia: lacerations were usually sutured within three hours of the injury. For septic patients, such as those with boils and abscesses which needed incision, general anaesthesia was used in about half the cases, the remainder being operated upon under local anaesthesia. It was not always possible to ensure that clean and septic patients were not in the theatre at the same time. All patients except 14 returned for inspection of their wounds, usually on the sixth or seventh post-operative day, and were seen by one of us (J. McK. B.). The room in which they were seen had been used during the preceding two hours for the treatment of both clean and septic patients.

Bacteriology.—Swabs were taken from the noses of clean patients, from the incised lesions of septic patients, and from lacerations immediately before toilet and suture. In addition, swabs were taken from any subsequently infected wounds.

Results

Between November 24, 1960, and March 3, 1961, 362 clean patients and 140 patients with sepsis underwent operation. The patients with sepsis were spaced uniformly throughout the period. *Staph. aureus* was isolated from 93 lesions, organisms other than *Staph. aureus* were isolated from 19, and cultures were sterile or swabs were not taken from the remaining 28.

Table I shows the distribution of the clean patients in terms of age, sex, reason for operation, and site of operation. The presence of subsequent suppuration in clean patients is shown in Table II, together with the average number of days' attendance. It will be seen that 35 (10%) had visible pus in the wound at the first attendance after operation. Table III shows the bacteriological results of examining these wounds.

Dr. Jevons, of the Central Public Health Laboratories, Colindale, kindly typed our staphylococci. The 11 strains of *Staph. aureus* isolated at first dressing were all different. None were of the same type as any of

the strains isolated from septic patients on the day of the operation or during the preceding three days. They also differed from the strains isolated from the noses of clean patients during the same period. There was thus no evidence that any of our clean patients who later developed staphylococcal sepsis had been infected from septic patients using the same theatre, or, in other words, that the 140 septic patients had been responsible for staphylococcal sepsis in the 362 clean patients.

TABLE III.—Results of Examining Swabs from Septic Wounds of Originally Clean Patients

	At First Dressing	Subsequently
Total cases of sepsis	35	14
With organisms: total	24	8
<i>Staph. aureus</i>	11*	2
<i>Ps. pyocyanea</i>	1†	2
Coliform bacilli	2	—
Coagulase-negative staphylococci ..	10	4
Culture sterile	9	4
No swab examined	2	2

* Including one swab with *Staph. aureus* and *Strep. pyogenes*.

† Including one swab with *Ps. pyocyanea* and coagulase-negative staphylococci.

The proportion of patients having pus present in the wound at first dressing increased with age: this was particularly striking in patients with lacerations. There were 193 patients with lacerations who were less than 45 years. Of these, 3.6% had pus at first dressing as compared with 18.5% of patients with pus from the 93 patients who were over 45 years old. No explanation is offered to account for this finding.

Post-operative chemotherapy was given to 32 of the clean cases. Four (12%) of these later had pus at the first dressing, compared with 31 (9%) of the 330 patients who were not so treated. None of the patients with pus but with a sterile culture had received chemotherapy.

Of the 354 clean patients examined, 146 (41%) were found to be nasal carriers of *Staph. aureus* at the time of operation. Of these 146 carriers, 6 (4.1%) were infected with staphylococci at the first dressing as compared with 5 (2.4%) of the 208 non-carriers. In three of the nasal carriers the staphylococcus in the nose at the time of operation was of the same type as that isolated from the subsequently infected wound.

Coagulase-negative staphylococci were occasionally isolated from swabs taken from lacerations before suture, but *Staph. aureus* was isolated from only six patients who have been classified as clean. None of these patients was found to have pus at the first dressing.

When pus did not appear in an initially clean wound until after the first post-operative dressing, its presence may have been unrelated to the original operation. However, patients in which this was noted were of some interest from other points of view. As will be seen from Table II, subsequent infection was known to have occurred in 14 patients. Table III shows the organisms present. In one of the cases in which *Staph. aureus* was found a staphylococcus of the same type had been isolated from the patient's nose and laceration at the time of operation.

Discussion

We have not produced any evidence that the use of a single theatre for clean and septic patients has resulted in infection of the clean patients. But these findings are subject to several reservations. What happens in one place may not happen in another, and if this investigation were to be repeated elsewhere different results might be obtained. We may perhaps have failed

TABLE I.—Particulars of 362 Clean Patients

Age	No.	Sex	No.	Site of Operation	No.
<15 years	7	Male	286	Face	46
15-24	92	Female	76	Scalp and neck	59
25-44	141			Hand	181
45-64	106	Operation		Wrist and arm	23
65+	16	Suture of laceration	288	Lower limb	32
		Removal of cyst, etc.	74	Other	21

TABLE II.—Clean Patients: Length of Treatment Related to Condition of Wound at First and Subsequent Dressing

	No. of Patients	Average Length of Attendance (Days)
Pus at first dressing	35	13
Incomplete healing (but no pus) at first dressing:		
Pus subsequently	14	23
No pus subsequently*	56	12
Complete healing at first dressing ..	243	7
Did not attend	14	—
All patients with pus	49	16
" other patients	299	8
" patients attending	348	9

* This group includes 10 patients who were discharged after the first dressing although erythema or moisture was still present.

to isolate staphylococci from wounds, and this may apply to swabs taken from noses and wounds at the time of operation. Compared with the extensive investigations of Williams and Miles (1949) our isolation rate of *Staph. aureus* from fresh lacerations was low. This was probably in part due to a difference in cultural methods, and in part due to the fact that our patients were attended to sooner after the accident and their lacerations were smaller. On the other hand, the much shorter time taken by the majority of wounds to heal is almost certainly because our patients were seen sooner after the operation, and were therefore eligible for earlier discharge. As did Williams and Miles (1949), we found that patients might become infected with staphylococci of the same type as those they carried in the nose. When allowance has been made for these reservations, it is still surprising that there was no apparent transfer of staphylococci from septic to clean patients. The explanation for this may perhaps lie in the careful surgical and nursing technique which was used.

In this series of patients with post-operative sepsis *Staph. aureus* accounted for less than a third of the infections at the first dressing. It is not possible to state a source for the majority of these organisms or for the other bacteria isolated from wounds. There can, however, be no doubt of the value to the patient and to the hospital of preventing post-operative infection. Return to work was quicker among the patients whose wounds healed without infection, and the length of their attendance in the casualty department was half that of the patients whose wounds became septic.

Summary

A series of 362 clean patients were operated upon in a casualty theatre used for clean and septic patients. At the first dressing, usually six to seven days later, 35 patients had wounds with pus. *Staph. aureus* was isolated from 11 of these wounds. All the strains were different in type, and none were of the same type as those infecting septic patients operated upon in the same theatre in the same period.

We are indebted to Mr. J. O. Robinson, surgeon in charge of the surgery, for permission to conduct this investigation, and to the sister in charge of the casualty theatre and her staff for their help. We would also like to thank the Medical Research Council for a grant supporting this work.

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"The first general anaesthetics in Gloucester were tried out privately by local doctors, and not, surprisingly, by the Infirmary staff. It was at the house of a Mr. Clutterbuck in February, 1847, that a woman had a finger amputated under ether. Her comments on regaining consciousness were 'God be praised! it is off! Thank you, gentlemen.' It was also Mr. Clutterbuck who introduced the use of chloroform to Gloucester in December, 1847, preferring the latter to ether. Sir James Simpson had only announced his discovery of the anaesthetic properties of chloroform the previous month." (*The Story of Gloucester's Infirmary*, by Brian Frith.)

TRIAL OF PROCAINE IN THE AGED

BY

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In recent published work in Rumania it has been claimed that procaine injections in the elderly produce widespread beneficial effects. The evidence for this, together with an extensive bibliography, has been summarized (Aslan, 1960). Procaine is stated to have a general "eutrophic effect" due to a "vitamin-like" action. Favourable improvement is reported in a large number of disorders. Arteriosclerosis affecting the nervous system, Parkinson's disease, pseudobulbar palsy, and the sequelae of cerebrovascular accidents are said to improve. An increase in physical agility and dexterity occurs, and mental function is enhanced in respect of memory, concentration, and interest. Both degenerative and rheumatoid arthritis show benefit (Aslan and David, 1957). Accelerated union of fractures is stated to occur. Ectodermal effects noted were improvement of senile skin changes and keratoses, psoriasis, vitiligo, lichen planus, and alopecia. Repigmentation and regrowth of hair has been observed.

The treatment is said to have a rejuvenating effect, and much experimental laboratory, biochemical, and clinical work is cited in support of this contention (Aslan, 1957, 1960). Prophylactic administration is now advocated to prevent the onset of senile degenerative changes and to arrest the ageing process.

Medical opinion in this country has been sceptical that rejuvenation can be produced in this way, and the need for a controlled clinical trial has been stressed (*British Medical Journal*, 1959). Much of the confirmatory work supporting this treatment has been published in Eastern Europe. Trials in this country have been, in the main, limited to clinical experience in small series with conflicting results. This paper reports the result of an investigation planned to establish whether procaine injections are of benefit to elderly persons and produce any of the effects claimed for this therapy.

Method

The trial was carried out with two groups of elderly people. The first (group A) consisted of hospital in-patients who were bedfast, incontinent, and confused owing to the combined effects of cerebrovascular disease and old age. This is not an uncommon category of patient in hospitals for the chronic sick. They are all heavy nursing problems, and no form of treatment, or rehabilitation, is known to improve their general state. As definite objective effects were to be looked for in this group no control solutions were used.

The second category (group B) comprised elderly infirm residents in local authority welfare accommodation. It was explained to those who agreed to co-operate that the injections might produce an improvement in general health or be without effect. It was emphasized that the injections would be continued for many months but that they, the patients, could withdraw from the trial if they felt they were being upset or made worse by them. This was a carefully controlled "double-blind"