

Review of Adult Intensive Care Services

in Northern Ireland

December 1998

CREST
CLINICAL RESEARCH EVALUATION SUPPORT TEAM

This booklet has been produced by the Clinical Resource Efficiency Support Team (CREST)

CREST is a small team of health care professionals established, under the auspices of the Central Medical Advisory Committee, to promote clinical efficiency in the Health Service in Northern Ireland while ensuring the highest possible standard of clinical practice is maintained.

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Contents

Page

Introduction	<u>3</u>
Definitions	<u>4</u>
Methodology	<u>5</u>
Results	
Number of beds	<u>6</u>
Occupancy	<u>7</u>
Admissions	<u>8</u>
Patient transfers	<u>9</u>
Refused admissions	<u>10</u>
Medical Staffing	<u>11</u>
Nurse Staffing	<u>12</u>
Support Staffing	<u>14</u>
Information	<u>15</u>
Finance	<u>15</u>
Impact of CREST guidelines	<u>15</u>
Audit	<u>16</u>
Commissioning	<u>16</u>
Discussion	<u>17</u>
Conclusions	<u>23</u>
Recommendations	<u>24</u>
Appendices	
1. Members of CREST Working Group	<u>27</u>
2. Members of CREST Sub-Group	<u>29</u>
3. Occupancy rates and interhospital transfers in selected units	<u>30</u>
4. Clerical and technical staffing levels in selected units	<u>31</u>

Review of Adult Intensive Care Services in Northern Ireland

Introduction

1. In 1993, the Intensive Care Working Group of the Clinical Resource Efficiency Support Team (CREST) completed an extensive review of adult intensive care services in Northern Ireland. Following the review, the Working Group published guidelines for clinical practice in intensive care and high dependency units and recommended quality standards which units should meet. The Working Group also agreed that the impact of their recommendations and guidelines should be evaluated in two to three years time. The Working Group reconvened in 1997 (membership is listed in [Appendix 1](#)).
2. The terms of reference were:
 1. to re-examine existing provision of adult intensive and high dependency care in Northern Ireland;
 2. to assess the impact of the 1993 CREST Guidelines on Adult Intensive Care Services;
 3. to consider arrangements for regional and national intensive care audit and to evaluate the potential costs and benefits of participation in the Intensive Care National Audit and Research Centre (ICNARC).

Definitions

The definitions of intensive and high dependency care are those which were used in the 1993 CREST report, namely:

Intensive Care

1. Intensive care is usually reserved for patients with potential or established organ failure. An Intensive Care Unit (ICU) should offer the facilities for diagnosis, prevention and treatment of multiple organ failure. The most commonly supported organ is the lung, but an ICU should offer a wide range of facilities for organ support. This will require a multidisciplinary team approach and the highest possible standard of nursing and medical care. A nurse/patient ratio of 1:1 should be the minimum and the services of a full-time medical resident are essential.

High Dependency Care

1. A High Dependency Unit (HDU) is an area offering a standard of care intermediate between the acute ward and full intensive care. The HDU should not manage patients with multi-organ failure, but should provide monitoring and support to patients at risk of developing organ system failure. A HDU should be able to undertake short term resuscitative measures and may provide ventilator support for a short time (usually less than 24 hours) prior to transfer of the patient to an ICU.
2. The HDU does not need and should not provide a full range of support services. It would normally function with a nurse/patient ratio of 1:2 and does not require the exclusive services of a full-time resident doctor.

Methodology

1. To meet its terms of reference, the Working Group established a small sub-group (membership in [Appendix 2](#)). The sub-group designed a postal questionnaire which was sent to the lead consultant in each of the sixteen intensive care and high dependency units in Northern Ireland. The questionnaire is available on request from CREST.
2. Non-respondents received one telephone reminder at two weeks. Fourteen of the sixteen units responded (response rate 88%). For some questions, telephone answers were sought from non-responding units. Responses were analysed on SPSS for Windows and proportions are based on the number of valid responses to each question.
3. The Regional Intensive Care Unit in Northern Ireland (RICU) is located at the Royal Victoria Hospital. Throughout this report, the term 'major acute hospital' refers to the following five units - Altnagelvin Hospital, Antrim Hospital, Belfast City Hospital (BCH), Craigavon Area Hospital and the Ulster Hospital, Dundonald. This report describes the pattern of intensive care and high dependency services as provided in October 1997. It is acknowledged that some changes will have occurred since then.

Results

a) Number of beds

1. Table 1 shows the number of staffed intensive care and high dependency beds in each unit. This data was provided by the lead consultant in the participating units. The figures shown in Table 1 therefore reflect staffed beds, rather than the number of beds actually available in a unit or the type of care routinely provided.

Table 1 Number of staffed beds in each unit

Hospital	Type of unit	Number of staffed beds	
		Intensive care	High Dependency
Altnagelvin	intensive care only	3.5	0
Antrim	intensive care only	4	0
BCH	intensive care and high dependency	7	2
Craigavon	intensive care and high dependency	4	2
Coleraine	intensive care and high dependency	2	2
Daisy Hill	high dependency only	0	8
Downe	high dependency only	0	3
Erne	intensive care and high dependency	3	2
Lagan Valley	high dependency only	0	2
Mater	intensive care only	3	0
Mid-Ulster	intensive care and high dependency	1	6
RICU	intensive care only	11	0
South Tyrone	high dependency only	0	7
Tyrone County	intensive care and high dependency	0	2
Ulster	intensive care and high dependency	4	1
TOTAL		42.5	37

2. In Northern Ireland, four units had staffed intensive care beds only, four had only high dependency beds and seven were combined units. There were approximately 42 staffed intensive care beds and 37 staffed high dependency beds. However, there were very few staffed high dependency beds in the Belfast area - three in total, two in Belfast City Hospital and one in the Ulster Hospital.

3. In Antrim Hospital only four of the eight available intensive care beds were staffed. There were three unstaffed beds in RICU and two in Altnagelvin Hospital. The problem of unstaffed beds also existed in Craigavon, Coleraine, Tyrone County and the Ulster Hospitals.
4. Only Belfast City Hospital had access to high dependency beds outside the intensive care unit (2 beds), although seven other units did have high dependency beds within the main intensive care area.

b) Occupancy

1. The average occupancy rate in high dependency and intensive care units had increased from 75% in 1993 to 79% in 1996. The occupancy rate in intensive care units in major acute hospitals and RICU had shown a similar increase from 75% to 80%. Reasons for increased occupancy were ranked in descending order as follows:
 - (a) increased professional expectations;
 - (b) medical/technological advances;
 - (c) increased patient expectation;
 - (d) other reasons eg more seriously ill patients, new equipment in the hospital, reduced ability of wards to nurse sick patients, more referrals of elderly patients.
2. The percentage of days when all intensive care and high dependency beds were full in major acute hospitals and RICU, ranged from 22-88% (mean 51%). Table 2 shows these results and occupancy rates in 1993 and 1996. All data was provided by participating units or taken from available 1993 data.

Table 2 Occupancy rates in selected units

Hospital	% of days when all beds were full 1996/97	Occupancy	
		1993	1996
Altnagelvin	36	70	66
Antrim	75	N/A	92
BCH	88	75	92
Craigavon	22	55	73
RICU	28	96	90
Ulster	54	77	67
Mean	51	75	80

[See Appendix 3 for other hospitals](#)

3. The number of bed days lost due to delayed discharge of patients was low across all units (range 10-80 days). The highest reported number of bed days lost was in Antrim Hospital (80 days).

c) Admissions

1. The number of admissions per year ranged widely from 67 in Lagan Valley to 733 in Daisy Hill. However, the proportion of admissions requiring ventilation was highest in Belfast City Hospital (91%) and RICU (69%). The high percentage in Belfast City Hospital may be explained by the fact that the hospital had a parallel high dependency unit and was therefore able to transfer out of ICU, patients who did not require ventilation. In the Regional Intensive Care Unit, the percentage of admissions requiring ventilation decreased slightly from 73% in 1993 to 69% in 1996. In major acute hospitals, the mean percentage of patients requiring ventilation increased from 45% in 1993 to 56% in 1996 (range in 1996, 35% in Craigavon Hospital to 53% in the Ulster Hospital).
2. A truer reflection of workload was the number of patients ventilated for more than 24 hours and the number of patient days ventilation. Information on both of these measures was sparse but is also shown in Table 3. From the available data, the Ulster Hospital had the highest percentage of admissions requiring ventilation for more than 24 hours (150/308, 49%) and the highest number of patient days ventilation (689 days). The lack of data on these measures in the Regional Intensive Care Unit is an issue which needs to be addressed.

Table 3 Activity in each unit 1995/96

Hospital	Number of patients admitted	% of admissions ventilated	% of admissions ventilated for > 24 hrs	Patient days ventilation
Altnagelvin	285	43	n/a	494
Antrim	247	43	26	n/a
BCH	285	91	n/a	n/a
Craigavon	322	35	15	421
RICU*	582	69	n/a	n/a
Ulster	308	53	49	689
Coleraine*	384	17	8	193
Daisy Hill	733	0	0	0
Downe	n/a	n/a	0	1
Lagan Valley	67	0	0	0
Mater	348	16	11	133
Mid-Ulster	164	2	<1	6
South Tyrone	443	1	0	n/a
Tyrone County	177	14	10	117

*calendar year

d) Interhospital patient transfers

1. In 1996, RICU admitted 267 patients who were not Eastern Board residents (46% of the unit's total admissions). This figure included direct admissions to RICU e.g. from Accident and Emergency Departments, and transfers from other intensive care/high dependency units. The main clinical reasons for transfer to RICU were the need for neurosurgical and thoracic services. Table 4 shows the number of patients transferred to and from selected units. Other units transferred out, or received fewer than five patients in the year. The figures presented are likely to underestimate the total number of interhospital transfers as data was not available from all units. There were at least 37 patient transfers between high dependency and intensive care units and 65 from participating units to RICU. However, RICU estimated that they received 120 interhospital transfers per year. The lack of accurate data reflects current information and recording systems in units and is an issue which needs to be addressed.

2. On average, 51% of interhospital transfers of patients requiring intensive care, occurred outside normal hours (range 29% Ulster Hospital to 77% Antrim Hospital)

Table 4 Interhospital transfers for selected units

Hospital	Transfers from the unit to	
	RICU	another ICU
Altnagelvin	15	4
Antrim	10	5
BCH	1	2
Craigavon	14	2
RICU	n/a	10
Tyrone County	8	5
Ulster	3	0
Other Hospitals	14	9
Total	65	37

[Note: see Appendix 3 for other hospitals](#)

The preferred solutions for interhospital transfer of patients were ranked in descending order as follows:

1. establish a retrieval team at RICU;
2. establish retrieval teams at RICU and major acute hospitals;
3. provide additional resources to smaller units;
4. continue with the current system.

e) Refused admissions

1. In 1995/96, 253 patients were recorded as having been refused admission to intensive care or high dependency units across Northern Ireland. Of these, 180 were refused admission to RICU, representing 31% of RICU admissions. In Belfast City Hospital, the refusal rate was 11%. For all other units the refusal rate complied with the recommended target of less than 5%.
2. The number of patients refused transfer between units was low. Seventeen patients requiring non-regional intensive care services were refused transfer and 18 requiring regional services were refused transfer. In these circumstances, some units maintained

patients in recovery areas or high dependency beds until an intensive care bed could be found. Table 5 shows a comparison between the diagnostic grouping of admissions and of patients refused admission.

Table 5 Diagnostic grouping of admissions and refusals to ICUs

Diagnostic Grouping	As a % of admissions	As a % of refusals
Medical	23	23
Surgical	64	75
Trauma	12	2

3. These results clearly showed that, although trauma patients made up 12% of admissions to an intensive care unit, they only accounted for 2% of refusals. Trauma patients therefore took precedence over other patients for intensive care services, as would be expected. Trauma patients appeared to be protected at the expense of surgical patients who contributed 64% of admissions but 75% of refusals.
4. The main reasons for having to refuse admissions were, in descending order:
 1. no available beds in the receiving unit;
 2. lack of nursing staff in the receiving unit;
 3. not clinically appropriate to transfer the patient.

f) Medical staffing

1. None of the units in Northern Ireland, including the Regional Intensive Care Unit, had a full-time intensive care specialist on its staff. Table 6 compares the number of consultant and junior sessions per week dedicated to intensive care duties.

Table 6 Medical staffing levels in selected intensive care units

Hospital	Number of staffed IC beds	Number of dedicated consultant sessions per week	Number of dedicated junior staff sessions per week
Altnagelvin	3.5	10	4
Antrim	4	4	0
BCH	7	10	10
Craigavon	4	10	5
RICU	11	10	40
Ulster	4	10	10

2. On average in each unit, consultants provided dedicated cover to the intensive care unit one day per week. However, in Antrim Hospital consultants could provide dedicated intensive care cover for only four sessions per week.
3. Of the high dependency and smaller combined units, only Coleraine Hospital had dedicated consultant anaesthetic cover and this was limited to one session per week. The planned appointment of an additional consultant anaesthetist at the Mater Hospital would provide dedicated cover for the unit for five sessions per week.
4. Dedicated junior staff cover for ICU was more variable, ranging from no dedicated cover in Antrim Hospital to 40 sessions per week in RICU. All units had arrangements for dedicated or shared, junior and consultant cover out of hours.

g) Nurse staffing

1. There were on average 5.5 whole time equivalent nurses per intensive care bed (range 4.4-6.3). Almost all nurses working in intensive care units had at least six months intensive care experience and between one quarter and one third held the intensive care certificate. The nursing complement for intensive care and for other units is shown in Tables 7a and 7b.

Table 7a Nursing staff levels in major acute hospitals and RICU

Hospital	Total number of staffed beds	Number of wte nurses	Number of wte nurses per bed	Nurses who held the intensive care certificate	
				number	% of wtes
Altnagelvin	3.5	21.5	6.1	7	36
Antrim	4	25	6.3	8	32
BCH	9	45.9	5.1	12	26
RICU	11	69.8	6.3	21	30
Craigavon	6	26.5	4.4	6	23
Ulster	5	24.8	5	10	36

Table 7b Nursing staff levels in HDUs and smaller combined units

Hospital	Total number of staffed beds	Number of wte nurses	Number of wte nurses per bed	Nurses who held the intensive care certificate	
				number	% of wtes
Coleraine	4	17.3	4.3	3	17
Daisy Hill	8	13.5	1.7	0	0
Lagan Valley	2	5	2.5	n/a	n/a
Mater	3	12	4.0	6	50
Mid-Ulster	7	14.2	2.0	n/a	n/a
South Tyrone	7	8.2	1.2	1	12
Tyrone County	2	6	3.0	2	33

- In high dependency and smaller combined units, the number of whole time equivalent nurses per bed varied from 1.2 in South Tyrone Hospital to 4.3 in Coleraine Hospital. Each of these units received approximately 400 admissions per year, but in Coleraine Hospital 17% of admissions required ventilation compared to <1% in South Tyrone Hospital.
- Again, almost all nursing staff had at least six months intensive care experience. Only four units: Craigavon Hospital, RICU, Ulster Hospital and Daisy Hill Hospital had a specialist nurse manager for the unit. In all units, nursing staff worked overtime when the unit was busy, but overtime hours accounted for less than 10% of total nursing time. In some units, nurses were given time in lieu rather than being paid for additional hours. In

South Tyrone Hospital, the Ulster Hospital, RICU and Belfast City Hospital nursing staff were designated to the unit and were not moved to work in other areas if the unit was quiet. Most units tried to second one or two nurses each year to undertake the intensive care certificate.

h) Support staffing

1. The majority of units had access to 0.5 wte clerical staff to support their work. However, Altnagelvin, Downe and Lagan Valley Hospitals had no clerical support. Technical and clerical support for the main intensive care units is shown in Table 8.

Table 8 Support staff in intensive care units

Hospital	Number of staffed beds	Number of wte clerical staff	Number of wte technicians
Altnagelvin	3.5	0	0
Antrim	4	0.3	0.1
BCH	7	0.5	0.5
Craigavon	6	1.5	1.0
RICU	11	3	2
Ulster	4	1	0

[Note: see Appendix 4 for other hospitals](#)

2. There was a marked difference in the clerical and technical support available in Altnagelvin Hospital compared to Craigavon Hospital. The number of admissions and the percentage requiring ventilation was similar in each unit. Of other hospitals, only Tyrone County, South Tyrone and Daisy Hill had significant levels of clerical support, but none had significant technical support.

i) Information

1. Of the 14 units which responded:
 - nine were able to monitor case-mix;
 - seven were able to monitor referral sources;
 - five were able to monitor outcomes;
 - Craigavon Hospital
 - Altnagelvin Hospital
 - Belfast City Hospital
 - Antrim Hospital
 - Ulster Hospital

j) Finance

1. Only three units had a ring-fenced budget for their units, but in none of these did the consultant in charge have budgetary control. Information on drug costs was provided to two of these units and to one on budget expenditure. No unit had access to information on cost per case per day.

k) Impact of CREST guidelines

1. All respondents were aware of the 1993 CREST guidelines. Two thirds said that the guidelines informed service developments 'occasionally', 7% said 'often'.
2. One in five units said that current practice met CREST guidelines in most respects, half said that the guidelines were only partly met. Areas identified as not being met included:
 - requirements for clinical audit;
 - dedicated consultant cover;
 - information gathering;
 - 1:1 nurse staffing ratios;
 - occupancy target of 70%;
 - number of beds;
 - input from referring consultants.
3. Eleven units (85%) had written guidelines on organ donations and used a scoring system to measure patient illness severity. APACHE II was the most commonly used system (7 units). Ten units had admission and discharge policies and nine of these were based on the CREST guidelines.

4. In half the units, the unit consultant had clinical responsibility for patients and had final responsibility for patient discharge.

l) Audit

1. Of all units, only those in Craigavon, Antrim and Altnagelvin Hospitals did not have access to audit assistants to support audit. Seven units (50%) had undertaken audit projects in the previous 12 months. Antrim Hospital completed the highest number of audits in a year (four). This was despite having no audit assistants. Only two units had audited practice against aspects of the CREST guidelines. One quarter of units felt that audit had improved clinical practice, but two thirds were unsure of its impact.
2. Half the units felt that implementing the system run by the Intensive Care National Audit and Research Centre (ICNARC) would improve the quality of audit and information. However, one third of respondents were not sure of its benefits.

m) Commissioning

1. Four units said that they had annual meetings with their main commissioners. Quality issues, contract volumes and costs were the most commonly discussed issues.
2. Each Board contracted for intensive care services in two ways. Firstly, for non-regional services, intensive care costs were included within specialty costs for each Trust. Indicative volumes were agreed, based on occupied bed days. If these were exceeded, a Trust could seek additional funding from the appropriate Board.
3. Secondly, regional intensive care services were commissioned through the Regional Consortium on behalf of the four Boards. Boards then paid according to their use of the regional unit. As the Regional Unit also provided a local service to Eastern Board residents, Eastern Board usage of RICU was higher than its capitation share (54% usage v 42% capitation).
4. Boards received information on monthly activity, APACHE scores and crude outcome measures and could also agree audit topics relating to intensive/high dependency care.

Discussion

The full Working Group on Intensive Care met and discussed the results of the survey. The main outcomes of these discussions are described below.

1. The 88% response rate to the survey was satisfactory, particularly as most questionnaires were completed fully. The survey results were discussed in relation to each of the recommendations made by CREST in 1993.
2. All units were aware of the CREST guidelines, **but only 7% said that the guidelines often informed service developments**. This was disappointing as the guidelines gave clear standards for clinical practice in intensive care and high dependency units. The majority of units (10) had written admission and discharge policies as recommended by CREST. Most of these were based on the CREST guidelines.
3. Of the main intensive care units, only Belfast City and Craigavon Area Hospitals had staffed high dependency beds in, or adjacent to the ICU. This arrangement provided a step down facility for patients who no longer required intensive care. Clinicians also commented that due to reductions in nursing staff, general wards were less able to nurse more seriously ill patients. This further reduced the scope for early discharge of patients from intensive care.
4. The number of intensive care and high dependency beds in Northern Ireland was difficult to quantify precisely due to variations in the way beds were funded and used. Nevertheless, it appeared that there were approximately 79 staffed beds - 42 intensive care and 37 high dependency beds.
5. Since 1993, average occupancy rates for all units had increased from 75% to 80%. Antrim Hospital, Belfast City Hospital and RICU had occupancy rates in excess of 90%. In 1993, CREST recommended that average occupancy for an intensive care unit should not exceed 70%. **This target was not being met despite an apparent increase in staffed beds**. It is likely that the main reasons for increased demand for intensive and high dependency care will remain, placing further pressure on available services.
6. Current demand on intensive care services was further demonstrated by **a refusal rate in RICU of 31%. This far exceeded the recommended refusal rate of less than 5%**. Belfast City Hospital was the only other unit which did not meet this target (11% refusal

rate). Both of these units provide regional services and it has been shown in the UK that units providing regional services are more likely than other units to experience greater demand for their services and therefore higher refusal rates.

7. As well as increasing demand for intensive care services, it appeared that patient dependency levels had also increased. In 1993, 45% of patients admitted to the main intensive care units in the Province required ventilation. In 1996, 56% of admissions required ventilation. This change in case mix has implications for nurse staffing levels and dedicated medical cover. Data on patient days ventilation and on the percentage of patients ventilated for more than 24 hours, was not widely available. This highlights the need for better information systems in intensive care and high dependency units.
8. The safety of interhospital transfers had been highlighted as an area of concern by previous research. It was beyond the scope of this survey to look at this issue in detail. However, the survey did find that approximately 50% of interhospital transfers occurred outside normal hours. Clinical circumstances may have made this unavoidable, but the alternative, of stabilisation locally and transfer with experienced staff in hours, should be explored further. **The clinicians' stated preferred solution to interhospital transfer was to establish a retrieval service at RICU. There are clearly advantages and disadvantages with this approach. A retrieval service and alternative approaches should be evaluated in more detail to determine the most cost-effective solution.**
9. Almost all nurses working in intensive care and high dependency units had at least 6 months intensive care experience. **However, the percentage who held the Intensive Care Certificate was only 25-30%.** Limited resources restrict a unit's ability to send nurses for this course, however, every effort should be made to address this.
10. It was encouraging that 85% of units used a patient severity scoring system. In 1993, this figure was only 58%. APACHE II was the most commonly used system (50% of units). In 1993 CREST recommended that APACHE II/III should be extended to all units.
11. The nurse:bed ratio in most intensive care units had improved since 1993 from an average of four per bed to 5.5 per bed. CREST recommended a 1:1 nurse:patient ratio for ICUs and 1:2 for HDUs. High dependency units typically had 2-3 nurses per bed. Comparison of nurse staffing levels between units must take account of casemix, as units which receive a high proportion of patients requiring ventilation, will need higher staffing levels than other units.

12. RICU and most intensive care units in major acute hospitals had dedicated consultant cover for ten sessions per week. The exception to this was in Antrim Hospital where only four sessions had dedicated consultant cover. In all intensive care and high dependency units, some consultant cover was available at all times. CREST recommended that the unit consultant should have final responsibility for clinical management and discharge of patients. This arrangement applied in only 50% of units. In remaining units, responsibility was shared, or lay with the referring consultant.
13. With regard to support staff, Altnagelvin, Downe and Lagan Valley Hospitals had no clerical support to their units. Of ICUs in major acute hospitals, Altnagelvin and the Ulster Hospital had no support from technical staff. This situation did not fulfil the CREST recommendation that all units should have technical, administrative and clerical support.
14. Costing information provided to units was scanty **as only two units were provided with information on drug costs and one on budget expenditure**. CREST had recommended that costing information should be available in all units to enable accurate costings to be apportioned to in-house and interhospital transfers.
15. It was disappointing that **only seven units had undertaken audit projects in the previous 2 months**. Even amongst these units, the highest number of audits carried out was four. Only two units had audited aspects of the CREST guidelines. This was against a background where all but three units had access to audit assistants.
16. The information system operated through the Intensive Care National Audit and Research Centre (ICNARC) had been suggested as a way of improving the quality of information on intensive care practice. ICNARC was established with Department of Health (London) funding in 1994, to develop and undertake comparative audit and evaluative research in intensive care. An initial work programme for ICNARC was aimed at:
 - describing current provision and practice of intensive care in the UK;
 - monitoring the overall impact of intensive care;
 - evaluation of specific aspects of intensive care practice.

17. To deliver this programme, ICNARC have, and are recruiting intensive care units throughout the UK. Current coverage is approximately 45%. **At present Craigavon Area Hospital and the Ulster Hospital are the only contributing units in Northern Ireland.** Each participating unit is required to collect standardised data on all admissions. To ensure completeness and accuracy of data, units are supported in data collection by audit clerks who complete a short training course with ICNARC. All data is forwarded to ICNARC for collation and analysis.
18. The core of ICNARC's work is the case mix programme. One of the key objectives of this programme is to provide confidential outcome comparisons between units, before and after case mix adjustment. This information will enable providers to compare their outcomes with those for other similar units. A six monthly report is provided by ICNARC to each unit director. Where units have received ICNARC funding from commissioners, unit directors agree for their commissioners to also receive the report. Each report includes:
- feedback on completeness and reliability of data submitted to ICNARC;
 - an assessment of the unit's case mix, using acute severity scores;
 - outcome measures
 - unit outcomes e.g.
 - survival from the unit
 - destination on discharge from the unit
 - hospital outcomes e.g.
 - survival from the hospital
 - destination on discharge from the hospital
 - crude mortality e.g.
 - unit mortality
 - hospital mortality
 - case mix adjusted mortality
 - mortality ratios i.e. observed deaths:expected deaths
 - unit activity e.g.
 - number of admissions and readmissions
 - length of stay, throughput
 - treatment methods e.g. ventilation.

In addition to the case mix programme, ICNARC is also surveying provision of intensive care throughout the UK and has established Working Groups on Costings, on Graded Organ Dysfunction Scoring and on updating the Therapeutic Intervention Severity Score (TISS).

19. Each participating unit in ICNARC incurs start up and revenue costs. For RICU, these have been estimated as follows:

• start up costs	£	
- database software	4,500	
- personal computer	2,000	
- training costs for 3 staff	1,170	
	Total	7,670
• annual revenue costs	£	
- fee to ICNARC	1,500	
- 1 wte audit clerk	12,000 - 15,000	
Maximum total revenue costs		£16,500

It is envisaged that smaller units would not require a full-time audit clerk and that in major acute hospitals, 0.5 wte may be adequate. This would reduce annual revenue costs to approximately £9,000. This figure can be further reduced by an amount equivalent to any existing audit support in intensive care/high dependency units.

20. **Ideally, all intensive care and high dependency units in Northern Ireland should be funded to participate in ICNARC.** This would allow valid comparison of case mix adjusted outcomes across the region and could inform service developments and future commissioning. The revenue costs of complete coverage (approximately £100,000) makes this an expensive option. The alternative, of **establishing ICNARC in each major acute hospital and in RICU, would at least enable commissioners and providers to identify and start to address variations in outcome between the main intensive care units.** The third option is to implement ICNARC in RICU and to fund the systems already established in Craigavon and Ulster Hospitals. This is the least expensive approach and as ICNARC is a comparative database, outcomes from RICU, Craigavon and Ulster Hospitals could be compared with those from similar units in the UK. However, no data would be available from other ICUs in the Province, so the intensive care picture would remain largely incomplete.

21. The quality and value of information currently provided to commissioners and providers of intensive care in Northern Ireland is low. The provider resources required to collate this information could be used more effectively if they were targeted to support ICNARC.

Commissioners

and providers would then receive high quality comparative outcome data for a relatively small investment. It is recommended therefore that, as a minimum, commissioners should fund ICNARC within the Regional Intensive Care Unit. In addition, commissioners should aim to fund ICNARC in other intensive care units in Altnagelvin, Antrim, Belfast City, Craigavon and the Ulster Hospitals.

Conclusions

1. The Working Group concluded that the overall response of the Health Service in Northern Ireland to the 1993 CREST Report had been disappointing. Key areas of concern highlighted by the 1997 survey include:
 - (a) average occupancy in intensive care units was 81% despite a recommended maximum of 70%;
 - (b) the refusal rate for admissions to RICU was 31% against a recommended 5%;
 - (c) an increasing proportion of patients admitted to ICU required ventilation, resulting in greater workload;
 - (d) half of interhospital transfers to intensive care units occurred out of hours;
 - (e) there was limited provision of parallel high dependency units despite the 1993 recommendation;
 - (f) few units were participating in regular clinical audit;
 - (g) few units received information on costs.

2. However, the Working Group were encouraged that there were several areas where the CREST recommendations had been met wholly or partly:
 - (a) written operational policies existed in many units;
 - (b) almost all nursing staff working in ICUs had at least 6 months intensive care experience;
 - (c) the majority of units used a patient severity scoring system;
 - (d) nurse:bed ratios appeared to be satisfactory;
 - (e) there was dedicated consultant cover for ICUs;
 - (f) most ICUs had some technical and clerical support although further progress should be made in this area.

Recommendations

In light of the discussion, the Working Group agreed the following recommendations.

1. All units should have written operational policies which incorporate the guidelines from the 1993 CREST report. This does not prevent units from exercising their own flexibility to produce local variations in policy.
2. The lack of progress in developing parallel high dependency beds is very disappointing. It is therefore recommended that priority should be given to developing high dependency beds in the same area as intensive care beds or in an adjacent area. Exact arrangements should be appropriate to local circumstances and should ensure flexible use of beds.
3. The average percentage occupancy rate for an intensive care unit should not exceed 70%. This should ensure that units could respond to emergencies and that patients would be less likely to be refused admission.
4. The total number of acute beds in Northern Ireland is decreasing, but demand for intensive care services is increasing for a variety of reasons. It is therefore now more appropriate to recommend that there should be at least 2.5 funded intensive care beds per 100,000 population. This target also assumes appropriate provision of high dependency beds and must be seen within that context.
5. Units with high occupancy rates (>90%) and high refusal rates (>5%), should receive additional funding as a matter of urgency and as appropriate to the workload of those units. The policy of some ambulance crews to take major trauma patients to the nearest hospital is contrary to the recommendations of the Report on The Management of Major Trauma, Department of Health and Social Services (NI) 1992. This practice contributes to inappropriate use of resources and should be addressed by commissioners and relevant providers.
6. All units must be covered by trained nursing staff at all times. Less busy periods should be used for in-service training.
7. Adequate funding should be provided for the training of all nursing staff working in intensive care units. The Group would recommend the Specialist Practice Programme in Intensive Care for Adults which is currently contracted by the DHSS at QUB School of Nursing and Midwifery, Belfast.

8. A patient dependency scoring system should be used in all units in order to determine accurately the level of nursing resources required for each patient. The Intensive Care Society recommend that the staffing requirement necessary to provide a nurse at the bedside at all times is at least 6.3 wte per intensive care bed. This figure takes no account of sickness or maternity leave, nor does it make provision for a supervising nurse-in-charge and/or a 'runner'. The Working Group endorses the recommendation for at least 6.3 wte nurses per intensive care bed and recommends that units should move towards a more realistic staffing level of 7 wte nurses per bed. In addition, each intensive care unit should have one nurse-in-charge who has no "hands on" responsibility for patients.
9. The Group supports the guidance of the Intensive Care Society that dedicated consultant sessions are required to staff an intensive care unit. Consultant cover should be available at all times for all units. In addition, each intensive care unit should identify one consultant as clinical leader for the unit.
10. All junior doctors in anaesthetics are exposed for short periods to training in intensive care. However, there is need for an advanced training programme for a small number of doctors who have a particular interest in intensive care. It is recommended that two training slots should be provided - one for those pursuing a career in intensive care and the other for doctors from other specialities who wish to have expertise in intensive care. The group were disappointed that a similar recommendation in the 1993 report had not been implemented.
11. Despite an improvement since 1993, technical support in some units remains inadequate. This should be addressed so that all units have adequate levels of technical, administrative and clerical support.
12. It is recommended that all units should use the APACHE II patient severity scoring system to enable accurate comparisons to be made between hospitals.
13. Regular medical and clinical audit should be carried out by all units. Current levels of audit activity are low despite support from audit assistants.
14. It is important that accurate costing information is available in all units. It was noted by the Group that the cost apportioned to intensive care services is generally lower in Northern Ireland than in other parts of the UK.

15. The Regional Strategy and Well Into 2000 have flagged up the need for further rationalisation of acute hospitals in Northern Ireland. The Working Group recommends that intensive care services should be focused on the Regional Intensive Care Unit and units in the five other major acute hospitals. This should take place within the context of an adequate number, and appropriate distribution, of well-resourced high dependency beds throughout Northern Ireland. Good communication and clinical networks between intensive care and high dependency units are essential to ensuring that a patient receives specialised care in the setting most appropriate to their clinical condition. In addition the concept of establishing a retrieval service for transferring patients between units should be urgently addressed.

16. Resources should be provided for the Regional Intensive Care Unit, Altnagelvin, Antrim, Belfast City, Craigavon and the Ulster Hospitals to allow them to participate fully in the ICNARC initiative. Clinical audit departments in these hospitals should provide the necessary administrative support for intensive care audit.

17. Given the failure of the health service to implement many of the recommendations of the 1993 CREST Report on intensive and high dependency care, the Working Group recommend that CREST must secure the commitment of the HSS Executive to ensure that appropriate management action is taken at both strategic and operational levels if the professional guidance contained in this report is to be implemented.

Membership of the Intensive Care Working Group

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Appendix 3

Occupancy rates in selected units

Hospital	Occupancy	
	1993	1996
South Tyrone	62	60
Daisy Hill	n/a	75
Tyrone County	n/a	n/a
Coleraine	n/a	83
Mid – Ulster	95	95
Lagan Valley	n/a	75
Downe	n/a	n/a
Mater	73	80

Number of interhospital transfers between selected units

Hospital	Number of transfers <u>from the unit to</u>	
	RICU	another ICU
Mater	4	2
South Tyrone	n/a	n/a
Daisy Hill	n/a	n/a
Coleraine	5	5
Mid – Ulster	3	0
Lagan Valley	2	2
Downe	n/a	n/a

Clerical and technical staffing levels in selected units

Hospital	Number of staffed beds	Number of wte clerical staff	Number of wte technical staff
Coleraine	4	0.02	0.02
Daisy Hill	8	0.5	0
Lagan Valley	2	0	0
Mater	3	0.06	0.5
Mid-Ulster	7	0.1	0
South Tyrone	7	0.5	0
Tyrone County	2	0.5	0
Downe	3	0	0

