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Activity: Resuscitation Science Symposium Abstract
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Relation between Electrocardiographic Changes and Neurologic Outcomes in Patients Treated with Hypothermia after Out-of-hospital Ventricular Fibrillation Cardiac Arrest: J-PULSE-Hypo Registry

Author Block: Yoshio Tahara, Naoto Morimura, Kazuo Kimura, YOKOHAMA CITY UNIVER MED CTR, Yokohama, Japan; Ken Nagao, Surugadai Nihon Univ Hosp, Tokyo, Japan; Naohiro Yonemoto, Natl Ctr of Neurology and Psychiatry, Tokyo, Japan; Hiroyuki Yokoyama, Hiroshi Nonogi, Natl Cerebral and Cardiovascular Ctr, Osaka, Japan; J-PULSE-Hypo Investigators

Abstract:
Background: The 2010 American Heart Association Guidelines for cardiopulmonary resuscitation (CPR) and emergency cardiovascular care (ECC) recommend that comatose adult patients with return of spontaneous circulation (ROSC) after out-of-hospital ventricular fibrillation (VF) cardiac arrest should receive therapeutic hypothermia (Class I). However, it remains unclear whether therapeutic hypothermia is effective for cardiac arrest patients whose have VF initially, but not at hospital arrival.
Methods: We conducted a multicenter retrospective study at 14 institutions to evaluate the effect of therapeutic hypothermia on out-of-hospital cardiac arrest between January 2005 and December 2009. The study committee entrusted each hospital with the timing of cooling, cooling methods, target temperature, duration, and rewarming rate. Patients were divided into the VF-VF group, VF-PEA (pulseless electrical activity) group, and VF-Asystole group according to the pre-hospital initial rhythm and the hospital arrival rhythm, and neurologic outcomes at 30 days after cardiac arrest were compared. A favorable outcome was defined as a Cerebral Performance Category (CPC) of 1-2.
Results: A total of 127 patients were studied. There were no significant differences among the VF-VF group (n=77), the VF-PEA group (n=34), and the VF-Asystole group (n=16) in age, sex, frequency of witnessed cardiac arrest, the presence of bystander CPR, time to achieving target temperature, or duration of therapeutic hypothermia. The rate of favorable outcomes was higher in the VF-VF group (52%) than in the VF-PEA group (29%; $p<0.05$) and the VF-Asystole group (6%; $p<0.01$). Multivariate analysis showed that VF rhythm at hospital arrival was an independent predictor of favorable outcomes at 30 days after cardiac arrest.
Conclusions: Our results suggest that therapeutic hypothermia after ROSC most effectively improves neurologic outcomes in patients who have VF initially as well as at hospital arrival, with no ROSC by the time of hospital arrival. Additional therapeutic strategies are needed to improve neurologic outcomes in patients who have VF initially with no ROSC and a rhythm other than VF at hospital arrival.

Author Disclosure Information: Y. Tahara: None. **N. Morimura:** None. **K. Kimura:** None. **K. Nagao:** None. **N. Yonemoto:** None. **H. Yokoyama:** None. **H. Nonogi:** None.

Category (Complete): Hypothermia
Keyword (Complete): Hypothermia ; Ventricular fibrillation ; Post cardiac arrest care ; Emergency care ; Cardiopulmonary resuscitation
Presentation Preference (Complete): Poster Only
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***Disclosure**: There are no unlabeled/unapproved uses of drugs or products.

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AHA/ReSS 2011

Effects of Rapid Intravenous Ice-Cold Fluids for Patients Treated with Therapeutic Hypothermia

Masakazu Matsuzaki, Ken Nagao, Taketomo Soga, Hiroshi Nonogi, Hiroyuki Yokoyama, Naohiro Yonemoto and J-PULSE-Hypo investigators/ J-PULSE-Hypo Study Group

BACKGROUND

Animal data has demonstrated that the sooner cooling is initiated after return of spontaneous circulation (ROSC) from cardiac arrest (CA), the better the outcome. Although rapid infusion of ice-cold intravenous (IV) fluids is feasible, safe, and simple method for induction of hypothermia, it is unclear whether technique of ice-cold IV fluids for induction of hypothermia can increase neurological benefit in patients with ROSC after out-of-hospital CA due to shockable rhythm and non-shockable rhythm.

METHODS

The J-PULSE-Hypo was conducted a multi-center observational registry to investigate the effects of therapeutic hypothermia. In this study, we investigated the effects of ice-cold IV fluids in patients divided into initial CA rhythm (shockable rhythm and non-shockable rhythm). The primary endpoint was favorable neurological

outcome at hospital discharge.

RESULTS

Of the 452 unconscious adult patients who were treated with therapeutic hypothermia after out-of-hospital CA due to cardiac etiology, 435 who were cooled from 32°C to 34 °C using external devices or extracorporeal devices were included; 228 received induction of cooling using rapid infusion of ice-cold IV fluids, including 185 shockable CA and 43 non-shockable CA, and 215 did not receive ice-cold IV fluids, including 156 shockable CA and 59 non-shockable CA. The time interval from ROSC to induction of cooling was shorter in the IV group than in the non-IV group in each CA rhythm (median; 28 minutes vs. 133 minutes in the shockable CA, $p<0.0001$, 21 minutes vs. 81 min in the non-shockable CA, $p<0.0001$). The IV group had higher frequency of favorable neurological outcome than the non-IV group in the patients with shockable CA (68.6% vs.57.7%, $p=0.036$), but the two groups had similar frequency of favorable neurological outcome in the patients with non-shockable CA. Adjusted odds ratios for favorable neurological outcome after the IV group was 1.66 (95% CI, 1.04-2.65) in the patients with shockable CA, and 0.53 (95% CI, 0.20-1.40) in the patients with non-shockable CA.

CONCLUSION

Rapid infusion of ice-cold IV fluids for induction of hypothermia had neurological benefit for patients with shockable CA, but it had not neurological benefit for patients with non-shockable CA.

Cooling duration and rewarming speed in therapeutic hypothermia for out-of-hospital cardiac arrests: How should we combine the protocols?

Nobuaki Kokubu, Mamoru Hase, Kazufumi Tsuchihashi, Junichi Nishida, Yasufumi Asai, Naohiro Yonemoto, Hiroyuki Yokoyama, Ken Nagao, Tetsuji Miura, Hiroshi Nonogi

Background: Therapeutic hypothermia (TH) improves outcomes of patients with out-of-hospital cardiac arrest (OHCA). However, how we should combine cooling protocol and rewarming protocol to maximize TH protection remains unclear. In this study, relationships between cooling duration (CD), rewarming speed (RWSD), and neurological outcomes in patients with OHCA were examined by use of data in the multicenter registry of OHCA treated with TH in Japan (J-Pulse-Hypo registry).
Methods: Data from 452 patients were submitted to J-Pulse-Hypo registry from 2005 to 2009, but 73 patients lacked data of sequential deep body temperature. Thus, 397 patients were included in the present study and retrospectively divided into the four groups according to CD and RWSD: 50 patients with CD ≦24 hours and RWSD ≧ 2.0 ℃ / day (Short-Rapid, SR group), 51 patients with CD > 24 hours and RWSD 2.0 ≧ ℃ / day and (Long-Rapid, LR group), 124 patients with CD ≦ 24 hours and RWSD < 2.0 ℃/ day and (Short-Slow, SS group) and 154 patients with CD > 24 hours and RWSD < 2.0 ℃/ day and (Long-Slow, LS group). Favorable neurological outcome was defined as cerebral performance category 1 or 2.
Results: There was no significant inter-group difference regarding gender, age, and percentages of presence of bystanders, bystander cardiopulmonary resuscitation and ventricular fibrillation in initial ECG, incidence of return of spontaneous circulation before admission and time needed to reach target temperature after the onset of cooling. However, LR group was less treated with IABP compared with the other groups (44.0% for SR, 23.5% for LR, 31.5% for SS, 50.0% for LS, $p<0.001$). Although the survival rate at 30 days was not statistically different in all four groups, the rate of favorable neurological outcomes was significantly higher in LR group than in the other groups (Figure 1A、1B).
Conclusion: These results suggest that CD > 24 hours and RWSD 2.0 ≧ ℃/ day is an appropriate combination of cooling and rewarming protocols.

Figure 1A

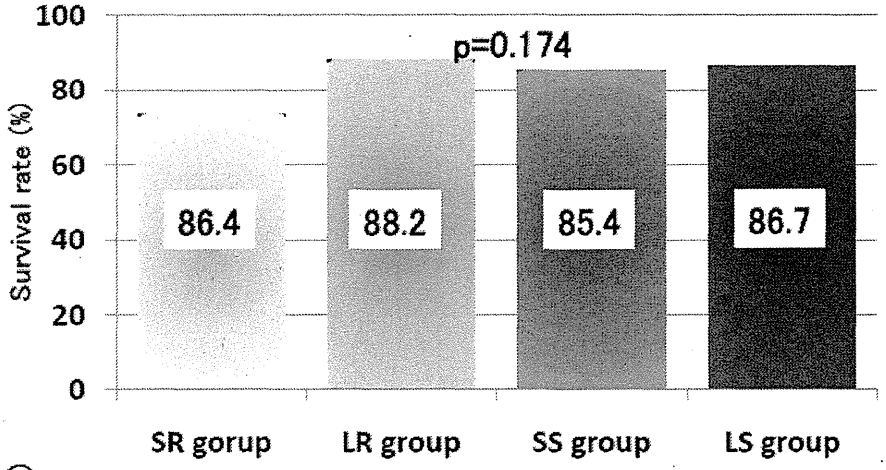

Figure 1B

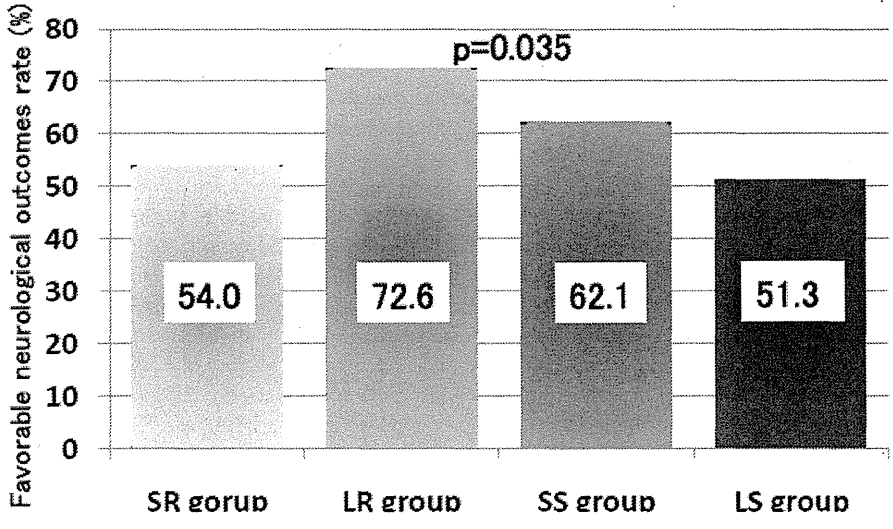

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Figure:250

Total:1940

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Activity: Abstract
Current Date/Time: 6/5/2011 10:43:16 AM

Does Neuromuscular Blocking Agent Help for Therapeutic Hypothermia? Results of a Multicenter Registry Study in Japan: J-PULSE-Hypo Registry

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Abstract: Therapeutic hypothermia for return of spontaneous circulation after ventricular fibrillation improves neurological outcomes of patients with out-of-hospital cardiac arrest. With the recent introduction of therapeutic hypothermia, the application of sedation has become necessary in cardiac arrest patients. However, the most appropriate sedative agents for use during the procedure have yet to be determined, especially as regards administration of neuromuscular blocking agents (NMBA). Methods: We conducted a multicenter study at 14 institutions, to evaluate the effect of therapeutic hypothermia on out-of-hospital cardiac arrest, between January 2005 and December 2009. The committee entrusted each hospital with the timing of cooling, cooling methods, target temperature, duration, rewarming rate, managing complications, and sedation methods. Enrolled patients were divided into group M (maintained with NMBA) and group C (without NMBA). Any complications (i.e., infections), time to target temperature, temperature stability, and neurological outcomes were compared. A favorable outcome was defined as a Cerebral Performance Category (CPC) of 1-2. Results: In total, 435 patients were enrolled in this study. There were no significant differences between the two groups. As compared with group C (N=355), group M (N=80) had higher rates of temperature instability (35% vs. 10%, p<0.01), temperature over-shoot (25% vs. 4%, p<0.01), and complications (33% vs. 19%, p<0.05). Both groups had favorable outcomes (56% vs. 61%, NS). Conclusions: This study suggested that NMBA have higher risk of some complications and poor temperature control. An application of NMBA should be careful of therapeutic hypothermia, though there is no difference for favorable outcomes.

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Author Disclosure Information: H. Arimoto: None. H. Rinka: None. N. Yonemoto: None. H. Yokoyama: None. K. Nagao: None. H. Nonogi: None.
Category (Complete): 410. Resuscitation, CPR, Emergency Cardiac Care, Critical Care, AED and Trauma
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Relationship between favorable neurological outcome and time interval from collapse to return of spontaneous circulation in patients treated with hypothermia after Ventricular Fibrillation Arrest Out of Hospital.: J-PULSE-Hypo

Background

For protection of the brain and other organs, hypothermia is a helpful therapeutic approach in patients who remain comatose after return of spontaneous circulation (ROSC). However, optimal time window for therapeutic hypothermia have not been determined. We investigated the relationship between neurological benefits and time interval from collapse to ROSC in patients treated with hypothermia after Ventricular Fibrillation (VF).

Methods

The J-PULSE-Hypo was conducted a multicenter observational registry to investigate the effects of therapeutic hypothermia. In this study, we investigated the relationship between neurological outcome at hospital discharge and time intervals from collapse to ROSC.

Results

Of the 452 unconscious adult patients treated with therapeutic hypothermia, 435 who were cooled to 32°C to 34°C were included; 341 were VF arrest (VF group) and 94 were non-VF arrest (non-VF group). The VF group had a higher frequency of favorable neurological outcome than the non-VF group (65% vs. 32%, $p<0.0001$). The favorable neurological outcome of VF group decreased in stepwise fashion across the increasing quartiles of the collapse-to-ROSC interval. The collapse-to-ROSC interval cutoff value of 28.5 min had an accuracy of 71% for identification of a favorable neurological outcome. A frequency of favorable neurological outcome was 80% in patients who achieved ROSC within 28.5 minutes after VF cardiac arrest.

Conclusions

In patients undergoing mild hypothermia after ROSC, time interval from collapse to ROSC was an independent predictor for a favorable neurological outcome. Further research is needed in patients with prolonged CPR of 28.5 min or longer.

The Impact of Bystander CPR on Defibrillation-Survival curve in Out-of-hospital Cardiac Arrest From All-Japan Utstein Registry Data

Naohiro Yonemoto[1]; Hiroyuki Yokoyama[2]; Ken Nagao[3]; Takeshi Kimura[4]; Hiroshi Nonogi[2]; JCS-ReSS group

[Background] The study objective was the effect of time to chain of survival from out-of-hospital cardiac arrest. Several studies had the effects of them on survival from sudden cardiac arrest. These studies were estimated from medium sample size before guideline 2005.

[Method] We used All-Japan Utstein Registry of the Fire and Disaster Management Agency with a prospective, population based, involving consecutive patients with an out-of cardiac arrest with witness with layperson, over 18 years, from April 1, 2006 to December 31 2009. The primary outcome measure was survival and good neurological outcome; CPC 1 or 2. We evaluated the effect and described the relationship of intervals from collapse to defibrillator with or without bystander CPR for the outcome.

[Results] 19993 adults were included in the analysis. The medium time to bystander CPR was 2 minutes. The medium time to defibrillation was 12 minutes (Figure). Adjusted odds ratio of the average effect of interval from collapse to bystander CPR per a minute was 1.09 and 95% Confidence Intervals (CI) 1.07 to 1.11. Adjusted odds ratio of the average effect of interval from collapse to defibrillator with bystander CPR per a minute was 1.11 and 95%CI 1.10 to 1.12. Adjusted odds ratio of the average effect of interval from collapse to defibrillator without bystander CPR per a minute was 1.12 and 95%CI 1.11 to 1.14. The effect of time to defibrillator with bystander CPR was better outcome than the effect of time to defibrillator without bystander CPR.

[Conclusions] Proportion of survival with good neurological outcome cardiac arrest differently decreased with time that defibrillation with or without bystander CPR was delayed. Bystander CPR before defibrillation showed better neurological outcome and gained about 5 minutes to obtain the same proportion of the survival without bystander CPR. Our results suggest the effect of times to the chain of survival from nationwide large population data.

Influence of Age Differences for Collapse-to--Defibrillator Time on Survival in Out-of Hospital Cardiac Arrest from All-Japan Utstein Registry Data

Naohiro Yonemoto[1]; Hiroyuki Yokoyama[2]; Ken Nagao[3]; Takeshi Kimura[4]; Hiroshi Nonogi[2]; JCS-ReSS group

[Background] The study investigated influence of age differences for collapse-defibrillator time on survival in out-of hospital cardiac arrest. Several studies had the effects of age on survival from out-of hospital cardiac arrest, however those were for medium sample size.

[Method] We used All-Japan Utstein Registry of the Fire and Disaster Management Agency with a prospective, population based, involving consecutive patients with an out-of cardiac arrest with witness with layperson, from 16 to 89 years (young adult: 16-39 age, middle: 40-64 age, older: 65-89 age) and from April 1, 2006 to December 31 2009. The primary outcome measure was survival and good neurological outcome CPC 1 or 2. We evaluated the effect of collapse-defibrillator time for the outcome in logistic regression by age group.

[Results] 1329 were young adults, 7400 were middles and 10315 were at older in the analysis. Odds ratio of the average effect of the time per five minutes by defibrillator was 1.53 and 95% confidence intervals (CI) 1.36 to 1.73, $p<.0001$ at young adult, 1.61 and 95%CI: 1.53 to 1.71, $p<.0001$ at middle, 1.77 and 95%CI: 1.67 to 1.87, $p<.0001$ at older (figure).

[Conclusion] Our results suggest that the effect of the times by defibrillator has age differences. Elderly person need more to improve the delay of defibrillator.

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Nationwide Epidemiology and Outcomes from Paediatric Out-of-hospital Cardiac Arrest in Japan; from JCS-ReSS Research Group

Author Block: Naoki Shimizu, Tokyo Metropolitan Children's Medical Ctr, Tokyo, Japan; Kunio Ohta, Kanazawa university, Kanazawa, Japan; Masahiko Nitta, Osaka Medical Colledge, Osaka, Japan; Naohiro Yonemoto, Natl Ctr of Neurology and Psychiatry, Tokyo, Japan; Hiroshi Nonogi, Natl Cerebral and Cardiovascular Ctr, Osaka, Japan; Ken Nagao, Nihon Univ, Tokyo, Japan; Takeshi Kimura, Kyoto Univ, Kyoto, Japan; JCS-ReSS Research Group

Abstract: Background: Though Resuscitation Outcomes Consortium (ROC) reported large volume epidemiology from US and Canada in 2009, data for paediatric cardiac arrest is still scant. Nationwide, prospective, population-based, observational larger study has done in Japan. We reported epidemiology and outcomes from paediatric out-of-hospital cardiac arrest (OHCA) in Japan with comparison to ROC study.
Methods: Nationwide OHCA registration performed from 2005 to 2009, and gathered 547,218 cases. We enrolled 11,322 children aged less than 20 years, and were stratified into 3 age groups as same as ROC study [infants (<1 y, n 4,006), children (1-11 y, n 3,372), adolescents (12-19 y, n 3,944)]. Initial cardiac rhythms (VF/VT versus Asys/PEA), pre-hospital intervention done by emergency medical teams (EMT), and outcomes were analyzed.
Results: The incidence of paediatric OHCA in Japan was 9.81 per 100,000 person-years (74.32 in infants 5.46 in children, 8.17 in adolescents), versus 8.04 in ROC. Good neurological outcome (CPC 1 or 2) for all paediatric OHCA was 5.4% (2.9% for infants, 7.5% for children, 6.2% adolescents) versus 6.4% survival to hospital discharge in ROC. In VF/VT group showed similar trends to ROC, but in Asys/PEA group, good neurological outcome was only 1.1% versus 5% in ROC ($p < 0.005$). Analysis of EMT intervention showed defibrillation performed in 95% for adolescents, but only 59% for children and 48% in infants despite indicated. Implementation ratio of other procedure for children was 20% for advanced airway (73% in ROC), 1.7% for resuscitation drug therapy (30% in ROC), 7.1% for IV line (42% in ROC), none for IO line (38% in ROC) in Japan.
Conclusion: This study demonstrates that the incidence of paediatric OHCA and outcome of VF/VT group are similar to previously reported epidemiology from North America. Asys/PEA group showed significantly worse outcome in Japan. It may relates to the low implementation ratio of pre-hospital intervention by EMT for children in Japan.

Author Disclosure Information: N. Shimizu: Research Grant; Modest; Govermental grant. K. Ohta: None. M. Nitta: None. N. Yonemoto: None. H. Nonogi: None. K. Nagao: None. T. Kimura: None.
Category (Complete): Cardiac Arrest
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Accessibility of emergency medical systems affects cardiovascular mortality in nationwide survey

Objective: Emergency cardiovascular cares for patients with acute cardiac disease are necessary to make better prognosis, especially for acute myocardial infarction. To improve the time to treatment, the emergency medical systems (EMS) and the cardiovascular emergency hospitals cover whole areas in Japan with universal coverage of medical insurance. We examined the influences of accessibility of EMS on cardiovascular mortality in Japan (population: 128 million, area: $378*10^3 km^2$).

Methods: We specified the cardiovascular emergency hospitals to be possible to treat acute myocardial infarction with the reperfusion therapies. Average ambulance transfer time to hospital was assumed to be measured by electric map as the time from public office to the nearest hospital in each city. Mortality was calculated by national census of year 2005 and the data of demographic death specified by ICD-10. Standardized Mortality Ratio (SMR) for cardiovascular was adjusted by age and gender. The influences of transfer time, number of emergency hospitals in each city, and percent of habitable area on log SMR were determined by linear regression weighted by number of death.

Results: There were 1875 cities and 1998 cardiovascular emergency hospitals in Japan. Time to the hospital was 13(1-252) minutes, percent of habitable area was 0.45(0.02-1.00), and SMR was 1.02(0–2.48) [median (range)]. Longer transfer time, less emergency hospitals, and lower percent of habitable area increased SMR (Table1). High risk category with no emergency hospital, time >=30min, and habitable area <50% were much distributed on mountainous areas and peninsulas.

Conclusion: Cardiovascular mortality increased according to the inaccessibility to EMS combined transfer time, existence of cardiovascular emergency hospital, and geographical livability. These variations should be taken account to make EMS more effectively such as mobile telemedicine system with direct transmission of 12-lead ECG.

Table1. Effects of categorized characteristics of cities on SMR

Emergency hospital	Time	habitable area %	N of cities	Median SMR	SMR ratio	95% C.I.
No	>= 30min	< 50%	454	1.10	1.18	1.14 - 1.21
No	>= 30min	>= 50%	47	1.12	1.18	1.09 - 1.27
No	< 30 min	< 50%	256	1.10	1.16	1.12 - 1.20
No	< 30 min	>= 50%	317	1.02	1.05	1.02 - 1.08
Yes	< 30 min	< 50%	323	1.03	1.04	1.03 - 1.06
Yes	< 30 min	>= 50%	468	0.96	1	-

No: No cardiovascular emergency hospital in the city, Yes: 1 to 20

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Effect of Cardiopulmonary Resuscitation Training on Favorable Neurological Outcome for In-hospital Cardiac Arrest

Author Block: Kei Yoshikawa, Sakaide City Hosp, Sakaide, Japan; Hiroyuki Yokoyama, Natl Cerebral and Cardiovascular Ctr, Suita, Japan; Naohiro Yonemoto, Natl Ctr of Neurology and Psychiatry, Kodaira, Japan; Hiroshi Nonogi, Natl Cerebral and Cardiovascular Ctr, Suita, Japan; the J-RCPR Investigators

Abstract:
Background:
Many training courses for CPR have been performed to medical personnel but few data have been reported those effect.
Method:
From 2008 to 2009, during 24 month, 491 patients were registered in the Japanese Registry of CPR for In-hospital Cardiac Arrest (J-RCPR). In this study, 445 patients treated by the first responder received the CPR training (Group T n=357) and non-trained first responder (group n-T n=88) were analyzed. We evaluated the ratio of return of spontaneous circulation (ROSC) and good neurological function at discharge (CPC1 or 2 in Glasgow-Pittsburgh cerebral performance category) in each groups. We also analyzed each indexes by initial rhythm was VF/VT arrest (n=122) and PEA/Asystole (n=316).
Result: The ratio of ROSC, good neurological performance were 65.8%, 21.1% in group T, and 59.1,10.3% in group n-T (In good CPC $p<0.05$). In VF/VT, the ratio were 80.2%, 45.5% in group T, and 74.2%,15.4% in group n-T (In good CPC $p<0.01$). In PEA/Asystole, the ratio were 60.8%, 12.5% in group T, and 50.0%, 5.9% in group n-T.
Conclusion: In-hospital cardiac arrest treated by the first responder with the CPR training is significantly associated with higher rate of favorable neurological outcome, especially in VF/VT
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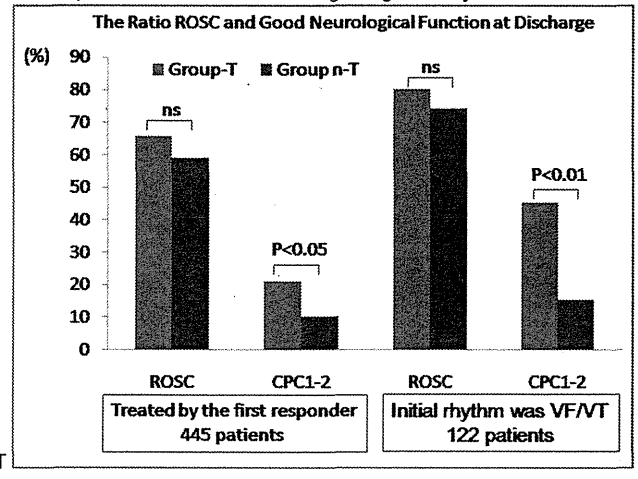

Author Disclosure Information: K. Yoshikawa: None. H. Yokoyama: None. N. Yonemoto: None. H. Nonogi: None.
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International Comparison of Paediatric In-hospital Cardiac Arrest - Impact of Critical Care Settings for Hospital Safety and Outcome; from The Japanese Registry of CPR for In-hospital Cardiac Arrest (J-RCPR)

Author Block: Sasa Kurosawa, Naoki Shimizu, Tokyo Metropolitan Children's Medical Ctr, Tokyo, Japan; Jun Honma, Chiba Univ, Chiba, Japan; Seishiro Marukawa, Iseikai Hosp, Osaka, Japan; Naohiro Yonemoto, Natl Ctr of Neurology and Psychiatry, Tokyo, Japan; Hiroyuki Yokoyama, Hiroshi Nonogi, Natl Cerebral and Cardiovascular Ctr, Osaka, Japan; J-RCPR Investigators

Abstract: Background: Number of paediatric intensive care unit (PICU) is scant in Japan (only 1 PICU bed available for more than 80,000 children). It may affect hospital safety issue relating to the paediatric in-hospital cardiac arrest (IHCA). We investigated the epidemiology of IHCA including location of events from domestic IHCA registration and performed international comparison.
Methods: Japanese Registry of Cardiopulmonary Resuscitation (J-RCPR) was established to accumulate events of IHCA. J-RCPR registered 491 adult events in 12 general hospitals, and 156 paediatric events in 4 children's hospitals from 2002 to 2009. Event location, etiology, and prognosis were analyzed. J-RCPR data was compared between children and adults. National paediatric data was compared to those from National Registry of Cardiopulmonary Resuscitation (NRCPR).
Results: From J-RCPR data, bradycardia was the most common first documented rhythm in children (36%, n=56). Major cause of adult CPA was arrhythmia (31%, n=150), whereas in children the main causes were hypotension (47%, n=73), acute respiratory insufficiency (28%, n=44). In children, over all ROSC was achieved to 56% (n=88) in J-RCPR versus 52% (n=459) in NRCPR. Paediatric survival to hospital discharge was 26% (n=41) in J-RCPR versus 27% (n=236) in NRCPR. J-RCPR showed 48% (n=75) paediatric events occurred in PICU versus 65% (n=570) in NRCPR, and up to 27% (n=40) paediatric events occurred in general ward in Japan versus only 14% (n=123) in NRCPR ($p<0.05$). Survival to hospital discharge was achieved in 27% (n=20) cases arrested in PICU versus 25% (n=10) cases arrested in general ward from J-RCPR data.
Conclusion: International comparison in paediatric IHCA showed similar tendency except for the event location. J-RCPR showed significantly low IHCA prevalence in PICU and high prevalence in general ward, which indicates poor compliance of preventive PICU admission before cardiac arrest in children with respiratory failure and shock. Although it didn't show statistical difference of outcome, it revealed poor hospital safety in Japanese children's hospital. It might be led by the difference of intensive care circumstances between Japan and North America, and by poor number of PICU beds in Japan, which needs to be corrected.

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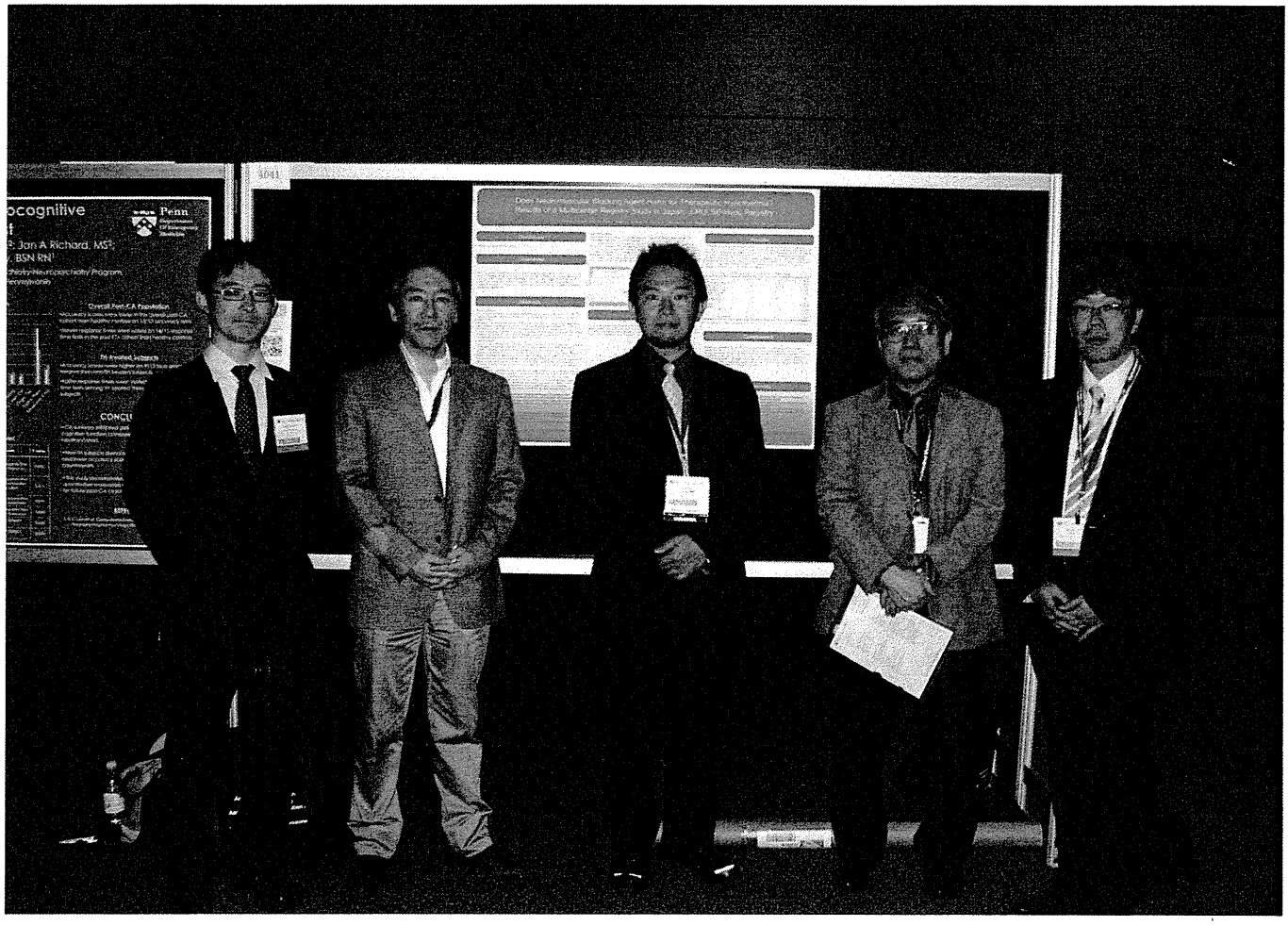
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SESSIONS 11
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TWO-DAY EVENT
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Nov. 12-Nov. 13, 2011

FOUR-DAY EVENT
with SCIENTIFIC SESSIONS
Nov. 12-Nov. 15, 2011

Orange County Convention Center, Orlando, Florida, USA

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Session XI

11:30 a.m.-1:00 p.m. Sunday 13 November

Best Original Resuscitation Science Poster Session and Luncheon

菊地　研　獨協医科大学 心臓・血管内科

Reported and Reviewed by Migaku Kikuchi

はじめに

日本でも蘇生科学への関心が高まり，今回のReSS（Resuscitation Science Symposium）でも昨年以上に日本からの発信を印象付けていたように思う。総務省が行っている世界に類をみない国家規模での全国ウツタイン登録をはじめとして，日本国内では数々の多施設登録による前向き観察研究が行われ，それらのデータを解析したグループから臨床的未解決事項への回答が発表されている。

JCS-ReSS グループからの発表

日本循環器学会（JCS）の蘇生科学小委員会を中心にしたJCS-ReSS（Resuscitation Science Study）グループは，2005～2009年までの5年間に全国ウツタイン登録された院外心停止55万例の解析を行い，臨床的未解決事項に回答している。今回は10演題の発表があり，このセッションでは3演題の発表がなされた（表1）。

Nishikawaらは，ガイドライン（G）2005での救急指令員の口頭指導によるbystander CPRの有用性を検討した。ガイドラインの移行期間である2006～2007年の2年間を除外した，bystander CPRがある目撃された心原性心停止それぞれG2000群5,883例とG2005群17,282例で比較した。G2005群では口頭指導によるbystander CPRの割合が42%と増え，とくに「胸骨圧迫のみのCPR」の占める割合が33%と著しく増えた。転帰では，G2005群で病院到着時の自己心拍再開（ROSC）（12.2%）も30日後の神経学的転帰（5.3%）も良好であった。胸骨圧迫のみのCPRに限定して比較した場合でもG2005群で同様に良好であった。G2005での口頭指導によるbystander CPRでのオッズ比はROSCが1.56，神経学的良好は2.17であり，有用であると結論付けた。

Hanadaらは，心室細動/頻拍（VF/VT）による心停止の場合に現場で何回電気ショックした後に病院へ搬送すべきなのか明らかにするために解析した。救急隊のプロトコルがG2005に基づいて変更された2007年1月以降で，18歳以上の目撃されたVF/VT心停止13,152例を病院へ到着するまでの電気ショックの回数で群分けした。それぞれ年齢/性別および救急隊がCPRを開始するまでの時間に差はなかった。Bystander CPR率はほぼ50%を超えていたが，bystanderによるAEDの使用は2～3%に留まっていた。電気ショック数が増加するにつれ，神経学的転帰が良好例（CPC1-2）の割合は減少する傾向にはあったが，3～8回では15%前後でほぼ一定であり，9～10回ではさらに減少するものの5%以上で維持されていた。このため，CPC1-2の転帰を20%以上で期待すると電気ショックは2回まで，あるいは15%とすると5回までが目安になると考えられる。このため，現場での電気ショックを2回までとすることは，CPC1-2の転帰が20%以上を期待でき，容認されると結論付けた。そして，この研究が救急隊のプロトコル改訂時の根拠になり得ることを期待していると締めくくった。

Nakashiroらは，心停止後30分以内に電気ショックを受けた18歳以上の目撃されたVF/VT心停止15,040例で二相性波形と単相性波形の効果と転帰を比較した。二相性群11,798例と単相性群3,242例を虚脱から電気ショックまでの時間ごとに比較した。全体を通して二相性のほうが良好な傾向がみられ，とくに6分から15分で有意にROSCが得られ，1か月後の神

表1　JCS-ReSS グループ

No.	Clinical Question	Presenter	Presentation Title
1	降雪地域での臨床的特徴と転帰	Hase M*	*Clinical Characteristics and Outcomes of Out-of-Hospital Cardiac Arrest Patients in Areas of Tremendous Snowfall*
2	小児例の臨床的特徴と転帰	Shimizu N*	*Nationwide Epidemiology and Outcomes from Pediatric Out-of-Hospital Cardiac Arrest in Japan; From the JCS-ReSS Research Group*
3	非心室細動例での救急隊による30:2と15:2の比較	Nagao K*	*30:2 vs 15:2 Compression-Ventilation Ratio by Emergency Medical Services Responders in Patients with Out-of-Hospital Nonshockable Cardiac Arrest*
4	年齢による電気ショックまでの時間の違い	Yonemoto N*	*Influence of Age Differences for Collapse-to-Defibrillator Time on Survival in Out-of Hospital Cardiac Arrest from All-Japan Utstein Registry Data*
5	救命例と非救命例での日内変動の違い	Tsukada T*	*Circadian Variation in Out-of-Hospital Cardiac Arrests in a Nationwide Japanese Patient Population: A Difference Between Survivors and Nonsurvivors*
6	救急隊による電気ショック1回と3回連続の比較	Yagi T*	*1-Shock Protocol Compared with 3-Stacked-Shock Protocol by Emergency Medical Services Responders in Patients with Bystander-Unwitnessed Out-of-Hospital Shockable Cardiac Arrest*
7	口頭指導の効果	Nishikawa K	*Effects of Dispatcher-Assisted Cardiopulmonary Resuscitation Recommended in the 2005 AHA Guidelines for CPR*
8	院外での電気ショックの回数と転帰	Hanada H	*How Many Shocks Should Be Given to Victims with Out-of-Hospital Cardiac Arrest with Shockable Rhythm On-site Before Transportation?*
9	電気ショックでの二相性波形と単相性波形での効果の比較	Nakashiro S	*Time-Dependent Benefit of Biphasic Defibrillators in Patients with Witnessed Out-of-Hospital Cardiac Arrest from VF/Pulseless VT*
10	除細動－救命率曲線でのバイスタンダーCPRの効果	Yonemoto N*	*The Impact of Bystander CPR on Defibrillation-Survival curve in Out-of-hospital Cardiac Arrest From All-Japan Utstein Registry Data*

＊の発表者の発表概要についてはSession IV（p.9-11）を参照。

経学的転帰も良好であった。これまでの二相性波型は低エネルギーで有効性が高いとの報告に加え，今回の研究では，観察研究ながら1カ月後の神経学的転帰を改善させたと示せた点で意義があると報告した。

J-PULSE Hypo グループからの発表

J-PULSE-Hypo study は「心原性心停止蘇生後の低体温療法に関する多施設共同登録研究」で，2005年から登録作業を開始し，臨床的未解決事項への回答を提示するべく検討している。今回はAHA本会での発表3演題を含む計7演題の発表があり，このセッションでは1演題の発表がなされた（表2）。

Shirai らは，ROSC後にST上昇が認められない症例の転帰を検討するため，ST上昇例（STE）と非ST上昇例（NSTE）へのカテーテル治療（PCI）および低体温療法の効果を比較した。2005～2009年までの登録症例452例のうち，ROSC後の心電図が確認できなかった例を除き，緊急PCIおよび低体温療法を施行した192例を解析の対象とし，STが上昇しているSTE群130例とNSTE群62例に分けた。NSTE群の内訳はST低下28例，Wide QRS 17例，正常17例であった。背景ではNSTE群で女性が少ないのみで2群間で差はなかった。全192例での30日生存率は79％で，神経学的良好例は55％，VF/VTに限定するとそれぞれは約80％，60％以上であった。PCPS（経皮的心肺補助装置）を用いた重症ショック例では，生存率が50％強，CPC1-2は30％程度であった。STE群とNSTE群の比較では生存率およびCPC1-2に有意差がなく，VF/VT例およびPCPSを用いた重症

表2　J-PULSE Hypo グループ

No.	Clinical Question	Presenter	Presentation Title
1	心室細動例での早期の自己心拍再開と早期導入による神経学的転帰への影響	Soga T*	*Influence of Early Return of Spontaneous Circulation and Early Induction of Cooling on Neurological Outcome in Patients Treated with Therapeutic Hypothermia After Out-of-Hospital Shockable Cardiac Arrest*
2	自己心拍再開例での適応例	Kasai A*	*Optimal Candidates for Therapeutic Hypothermia with Return of Spontaneous Circulation After Out-of-Hospital Cardiac Arrest*
3	心室細動例での心電図変化と神経学的転帰の関係	Tahara Y*	*Relation Between Electrocardiographic Changes and Neurologic Outcomes in Patients Treated with Hypothermia After Out-of-Hospital Ventricular Fibrillation Cardiac Arrest: J-PULSE-Hypo Registry*
4	早期のPCIとの併用効果	Shirai S	*Impact of Emergency Recanalization and Mild Hypothermia Therapy: Analysis of ST Segment of Electrocardiogram Following Recovery of Spontaneous Circulation After Cardiac Arrest*
5	氷冷水の急速輸液の効果	Matsuzaki M	*Effects of Rapid Intravenous Ice-Cold Fluids for Patients Treated with Therapeutic Hypothermia*
6	冷却期間と復温の速さ	Kokubu N	*Cooling Duration and Rewarming Speed in Therapeutic Hypothermia for Out-of-hospital Cardiac Arrests: How Should We Combine the Protocols?*
7	筋弛緩薬の併用効果	Arimoto H	*Does Neuromuscular Blocking Agent Help for Therapeutic Hypothermia? Results of a Multicenter Registry Study in Japan: J-PULSE-Hypo Registry*

＊の発表者の発表概要についてはSession IV（p.9-11）を参照。

表3　J-RCPR グループ

No.	Clinical Question	Presenter	Presentation Title
1	小児での国際比較	Kurosawa S	*International Comparison of Pediatric In-Hospital Cardiac Arrest: Impact of Critical Care Settings for Hospital Safety and Outcome. From the Japanese Registry of CPR for In-Hospital Cardiac Arrest*
2	入院経過時間と転帰との関係	Sasaoka T	*Favorable Prognosis in Cardiovascular Disease from In-Hospital Cardiac Arrest Developed Within 48 Hours of Hospital Admission: From the Japanese Registry of CPR for In-Hospital Cardiac Arrest (J-RCPR)*
3	CPRトレーニングによる神経学的予後への効果	Yoshikawa K	*Effect of Cardiopulmonary Resuscitation Training on Favorable Neurological Outcome for In-Hospital Cardiac Arrest*

ショック例に限定した比較でも，有意差は認められなかった。NSTE群では，多枝病変や左主幹部病変の重症例が含まれる一方，ST変化が現れにくい回旋枝病変や後壁梗塞の比較的軽症例が含まれることがその要因ではないかと推測しながらも，ROSC後のST変化に関わりなく，PCIと低体温療法を組み合わせた治療は有効であると結論付けた。

J-RCPR グループからの発表

日本でも12施設が共同して院内でCPRを施行した心停止例をウツタイン形式で登録している（J-RCPR）。2008～2009年の2年間で登録された491例での解析を行い，臨床的未解決事項に回答している。今回は3演題の発表があり，このセッションでは2演題の発表がなされた（表3）。

Kurosawaらは，小児病院4施設により2002～2009年までに登録された小児156例とJ-RCPRに登録された成人491例とで心停止の原因を比較した。小児では徐脈による循環不全はCPAに準じた状態としてCPRの対象となるため，徐脈によるものが36％を占め，その原因としても循環不全／低血圧が47％を

表4　このセッションでの日本からの発信

No.	要旨	Presenter	Presentation Title
1	20分程度の心停止による全心筋虚血では重篤な心筋障害は生じていない	Mizuno A	*Short-Term Total Myocardial Ischemia Solely Does Not Cause Significant Myocardial Injury*
2	遷延する心停止で経皮的脳酸素飽和度が検出できない場合には蘇生中止を考慮してもよい	Ito N	*Regional Cerebral Oxygen Saturation as a Novel Termination of Resuscitation Rule in Cases of Refractory Out-of-Hospital Cardiac Arrest*
3	現場から離れた電話での救急要請は情報が伝聞になるため，不良な転帰と関連している	Tanaka Y	*Emergency Calls Made Away from the Out-of-Hospital Cardiac Arrest Scene Are Frequently Classified as an Uninformative "Hearsay Call" and Associated with Poor Outcomes*
4	CPR実施者と傷病者との近親関係は救命率の上昇と関係する	Inaba H	*Does the Relation of CPR Performer to Victim Affect Survival of Out-of-Hospital Cardiac Arrest?*
5	中間潜時聴性誘発電位係数は蘇生の予測に有用かもしれない	Tsurukiri J	*Value of Initial Middle Latency Auditory Evoked Potential Index for Cardiopulmonary Arrest Resuscitation*
6	公共のAEDプログラムにはCPRトレーニングが必要である	Hayashi K	*Public Access Defibrillation Programs with Automated External Defibrillators Need Targeted Cardiopulmonary Resuscitation Training: Lessons from a Local Japanese City Database*
7	現場での救急救命士の人数が増えると蘇生の転帰が改善する	Kajino K	*Impact of the Number of On-Scene Emergency Lifesaving Technicians and Outcomes from Out-of-Hospital Cardiac Arrests*
8	看護師がBLS/ACLSスキルを修得し維持し続けることで院内心停止の転帰が改善する	Kikuchi M	*Nurses' Retention of BLS and ACLS Skills Improves Survival from In-Hospital Cardiac Arrest*
9	義務化したトレーニングはそれ以前のトレーニングの有無でCPR実施に異なる影響を及ぼす	Enami M	*The Effects of Obligatory Training on Attitudes Toward Performing Basic Life Support with Reference to Prior Training Experience*
10	小学5〜6年生はCPR+AEDトレーニングを理解できる	Iwami T	*Systematic CPR Training in Elementary Schools and Students' Attitudes Toward CPR and AED Use*
11	急性大動脈解離でのD-dimer陰性は「年齢が若い」と「解離腔が短い」に関係する	Satoh Y	*Negative D-dimer Test for Acute Aortic Dissection*
12	心室細動による心停止後の低心機能例に35-36℃の低体温療法は有効で安全に施行できる	Orita T	*Slight Therapeutic Hypothermia (35°C-36°C) for Post-Cardiac Arrest Syndrome Due to Ventricular Fibrillation with Low Left Cardiac Function Is a Feasible and Safe Possibility*
13	モノクロタリン誘発肺高血圧ラットでシルデナフィルとベラプロストはConnexin 43を介して心室細動の誘発を抑制する	Takase B	*Sildenafil and Beraprost Therapy Improve Arrhythmogenicity Through Connexin 43 Expression and Electrophysiological Property in Monocrotaline-Induced Rat Pulmonary Hypertension: Optical Mapping Analysis*
14	ラットによる出血性ショック心で人工酸素運搬体（人工赤血球）による蘇生は心室細動の誘発を抑制する	Takase B	*Efficacy of a Novel Artificial Oxygen Carrier (LHb) on Ameliorating Lethal Arrhythmogenetic Property in Hemorrhagic Shock Heart: Optical Mapping Analysis*

占めていた。一方，成人では循環不全／低血圧は20%弱に留まり，最多が不整脈31%であった。さらに，北米のデータ（NRCPR）との比較では，一般病棟でのCPA発生率が北米では14%に留まるのに対して，日本では4割強に達した。日本でのICUと一般病棟での転帰の比較では，とくに循環不全によるCPR症例で，ICUでのROSCは一般病棟よりも有意に良好であり，生存率もICUで良好であった。このため，ICU管理の重要性とともに，重症例を早期に認知してICU管理に繋げる必要があると結論付けた。同時に，日本での小児ICUが少ないために，重症例の多くがICU管理できていないとの問題点を改めて指摘