

Ham Radio in Hell and High Water Lessons from Japan's Earthquake, Tsunami, and Nuclear Crisis



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1

Thank you, local and remote friends; about the words in my title...

NOTE: This 2018 February 16 presentation to TIARA (Tokyo International Amateur Radio Association) was adapted for a general audience from a 2017 December 10 invited lecture at the 59th ASH (American Society of Hematology) Annual Meeting in Atlanta, Georgia:

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Ham Radio in Hell and **High Water**

Run-up height	Affected coastline
40.0 m	Ofunato City, Iwate Prefecture
>30 m	180 km from Onagawa to Noda
>20 m	200 km total coastline
>10 m	530 km total coastline

Mori N, Takahashi T, and The 2011 Tohoku Earthquake Tsunami Joint Survey Group.
Nationwide post event survey and analysis of the 2011 Tohoku earthquake tsunami.
Coastal Engineering Journal 2012; 54(1): 27 pages. DOI 10.1142/S0578563412500015



High water? Yes, the tsunami had run-up heights to 40 meters.

Ham Radio in Hell and High Water

Amateur by avocation

Professional by training

Radiation guy by way of

a nuclear accident



3

Ham Radio? Yes, TIARA members are amateurs by avocation, professionals by way of formal training, and I'm a radiation guy by way of a nuclear accident.

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Since 2011, Kenneth E. Nollet has received travel support from

- American Red Cross Biomedical Services
- American Society of Hematology
- Bio-Rad Australia
- International Atomic Energy Agency
- Mayo Clinic Alumni Association
- Medical Amateur Radio Society of Japan
- Radiation Injury Treatment Network
- OECD Nuclear Energy Agency
- Korea Institute for Radiological & Medical Sciences

to report personal experience and facts about Japan's earthquake, tsunami, and nuclear crisis.

Conflict of Interest (COI) disclosure, as required by the Japan Society of Transfusion Medicine and Cell Therapy



4

As such, since 2011 I've spoken around the world about Japan's earthquake, tsunami, and nuclear crisis, and various entities have covered my expenses.

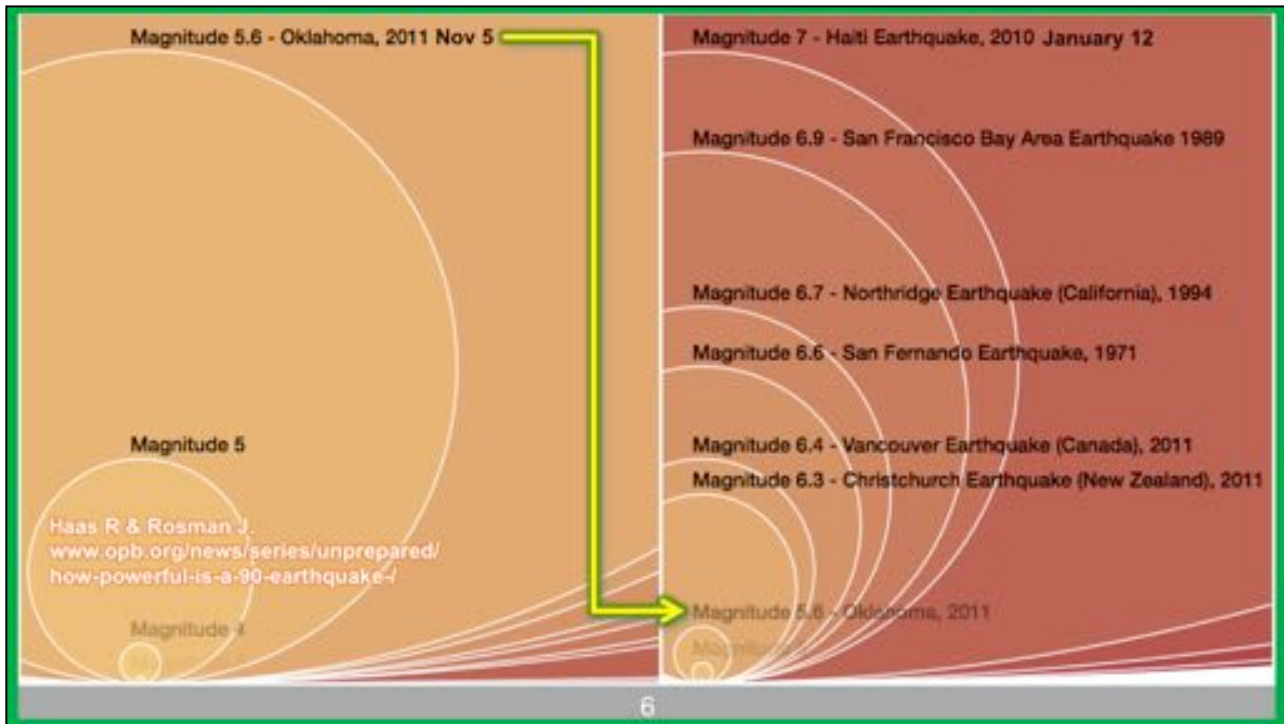
Hematology in **Hell** and High Water

Please form your opinions,
and I will offer mine
toward the end.

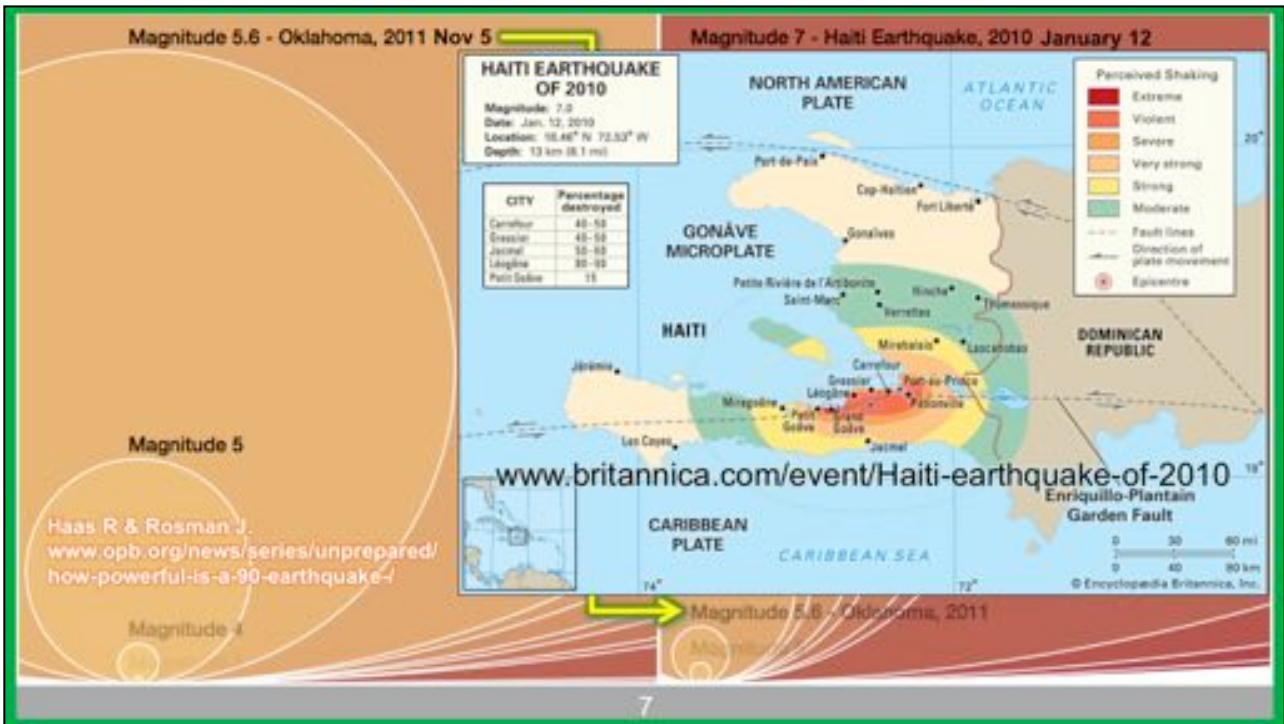


As for Hell? Please form your opinions, and I will offer mine toward the end.

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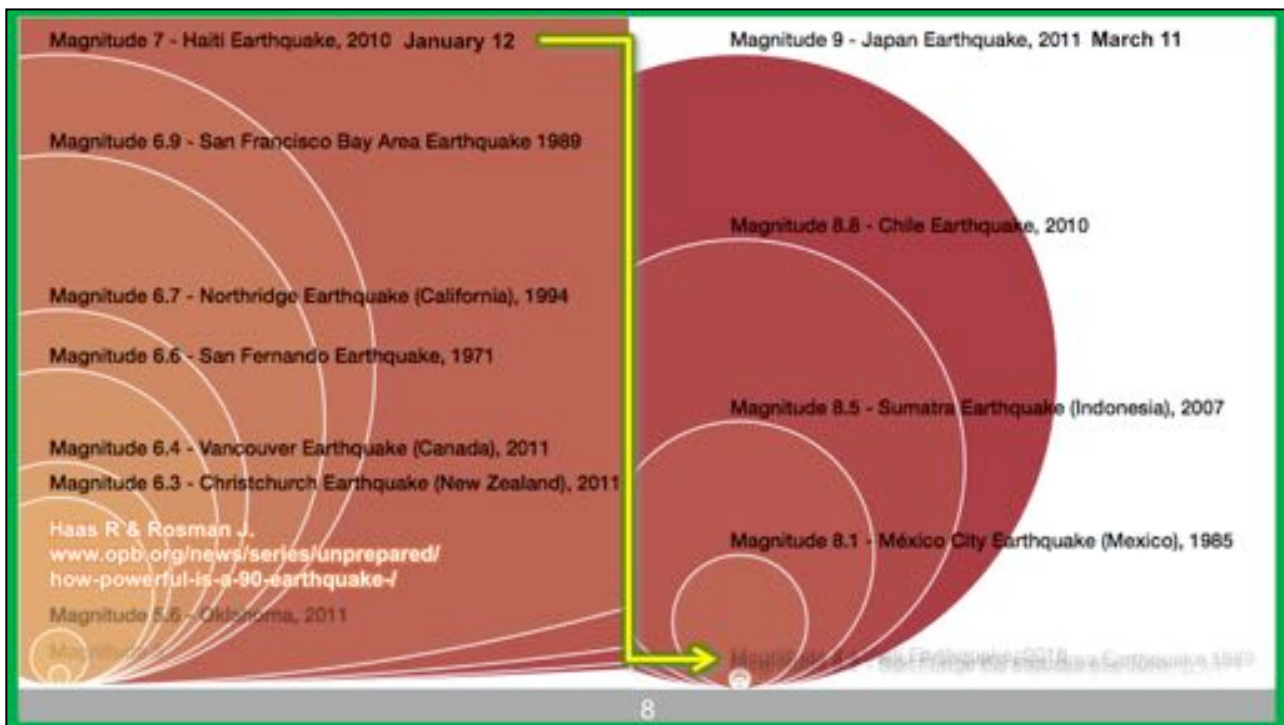


Japan does not have a monopoly on earthquakes. The American state of Oklahoma had a magnitude 5.6 quake in 2011. We need to scale that down to show how much stronger the magnitude 7 earthquake was that devastated Haiti in 2010...



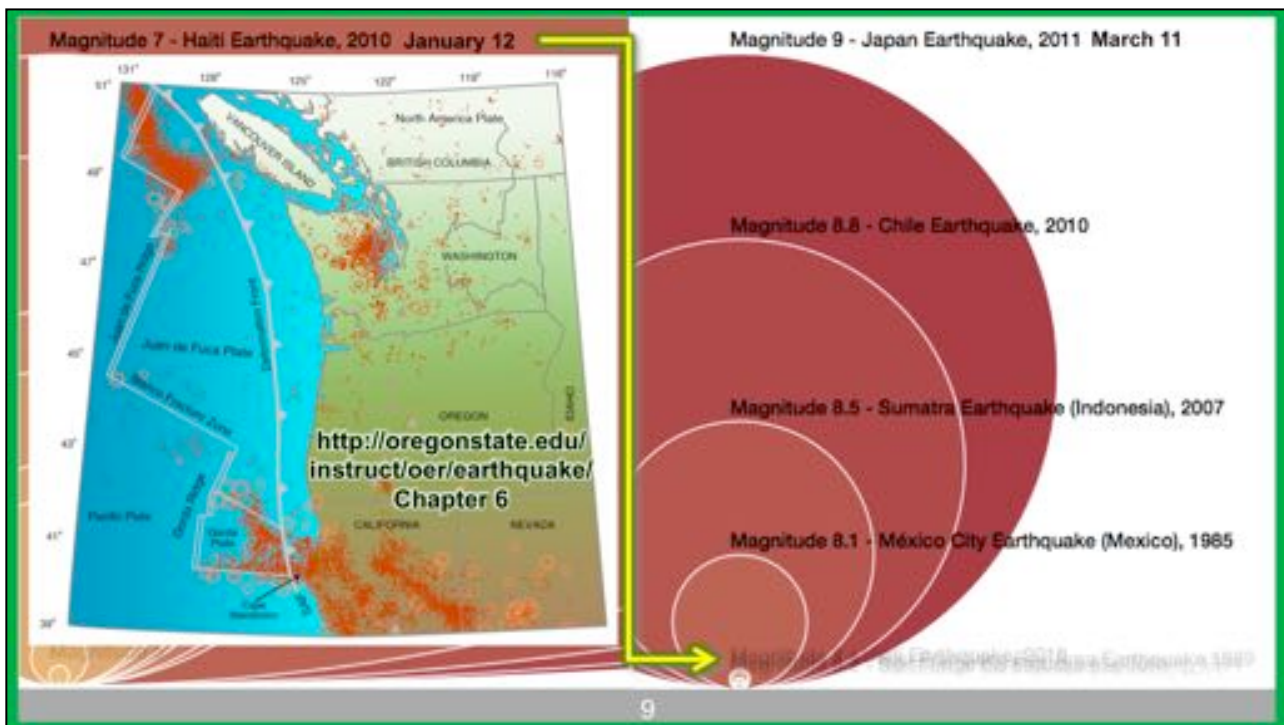
The epicenter of that Haiti earthquake was densely populated, and about a million people became homeless.

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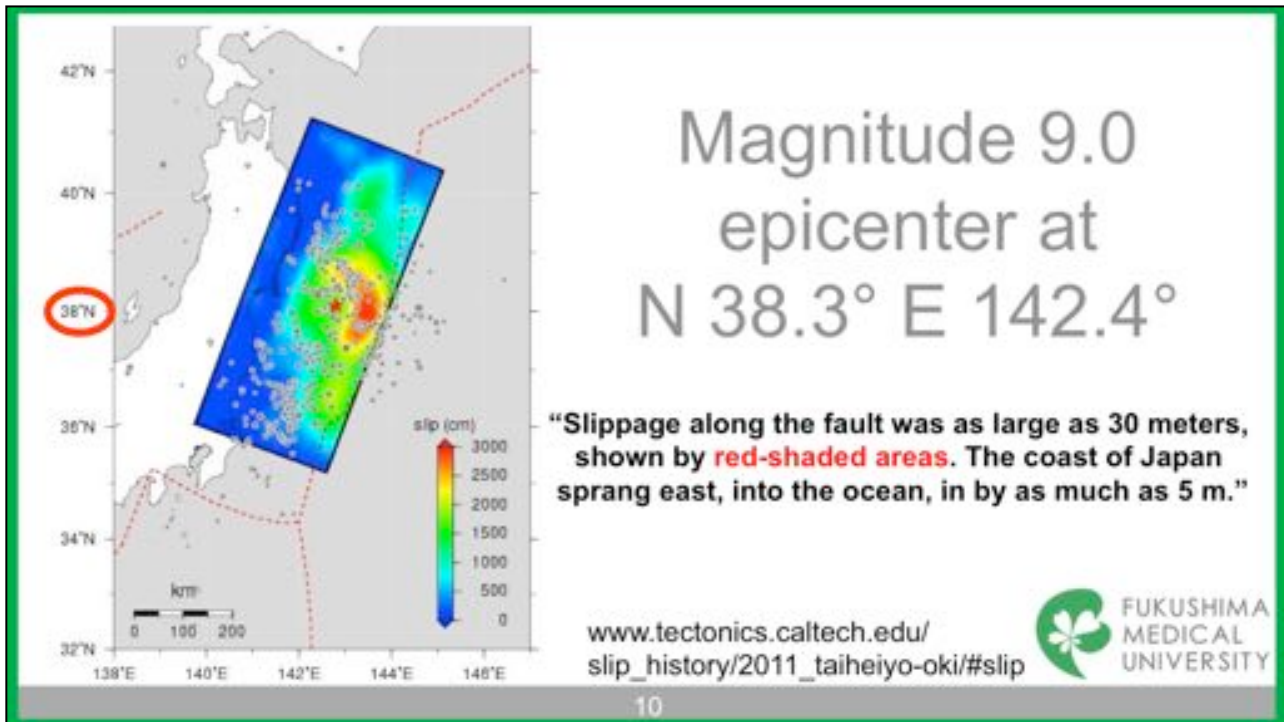


A magnitude 7 in Japan on March 9, 2011 turned out to be just a foreshock for the magnitude 9 that started at 2:46 PM, March 11. The moment magnitude scale is a log scale, and all those logs do a lot of damage.

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Oregon Public Broadcasting developed these graphics because the state of Oregon is in-between seismically active states Washington and California. America's Pacific coast is overdue for a similar event.



Our epicenter was off Japan’s Pacific coast, close to the politically significant 38th parallel. I’ll come back to that, but for now, the geological significance is that slippage along the fault was as large as 30 meters, and Japan’s coastline sprang east by as much as 5 meters...



...resulting in scenes like these, and an immediate loss of nearly 20,000 lives.



Who has ever had trouble with flight connections? Imagine being stranded on the upper floor of an airport concourse for two days. That's what happened in Sendai, the capital city of Miyagi Prefecture, just north of Fukushima.

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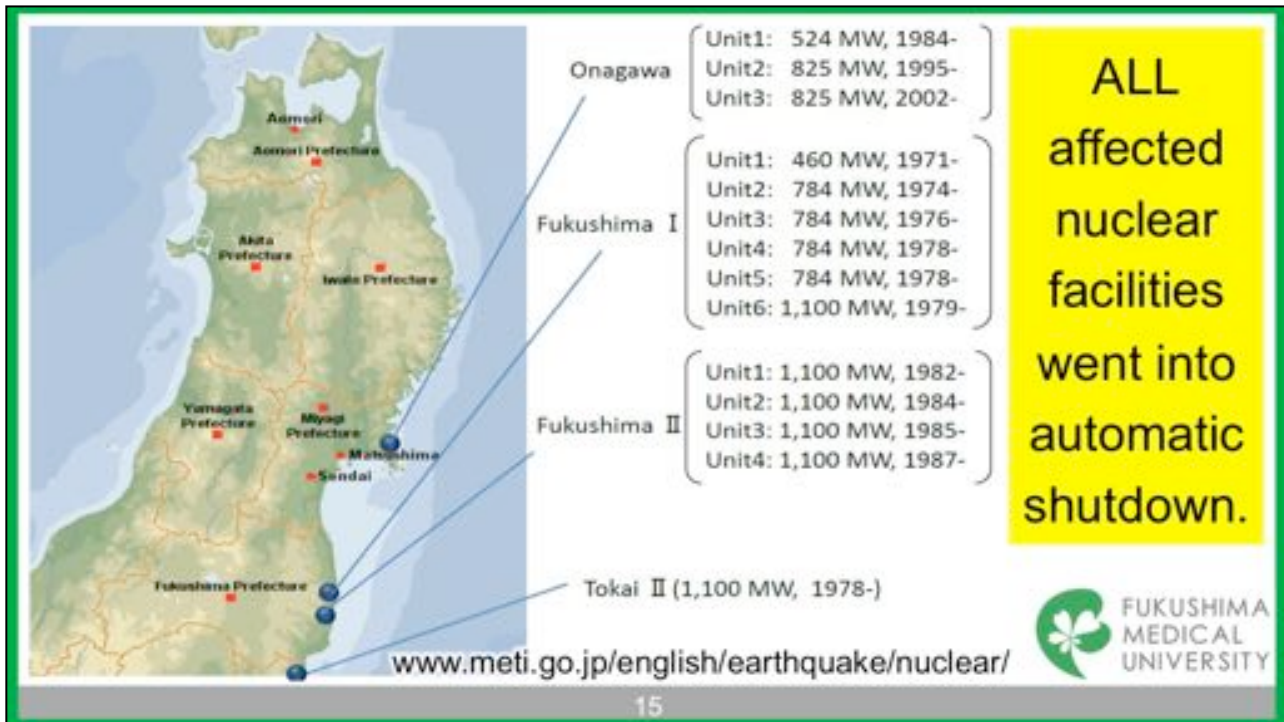


Fukushima City was inland from the tsunami, but we had our share of evacuees...

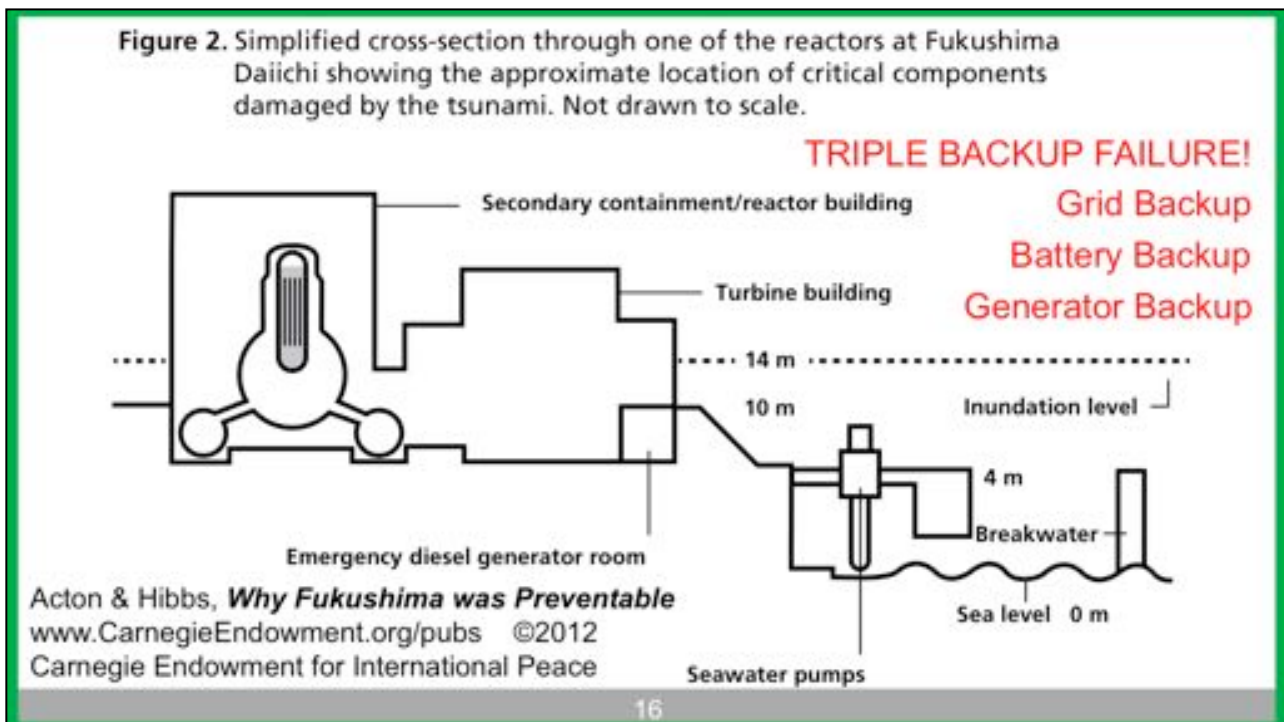


...for whom there were shelters, such as this primary school near my apartment. With or without nuclear complications, shelter hazards arise: many people sharing few toilets, hygiene, fluid restriction, immobility, whether people have their meds... so a frequent medical problem was deep venous thrombosis, also known as economy class syndrome.

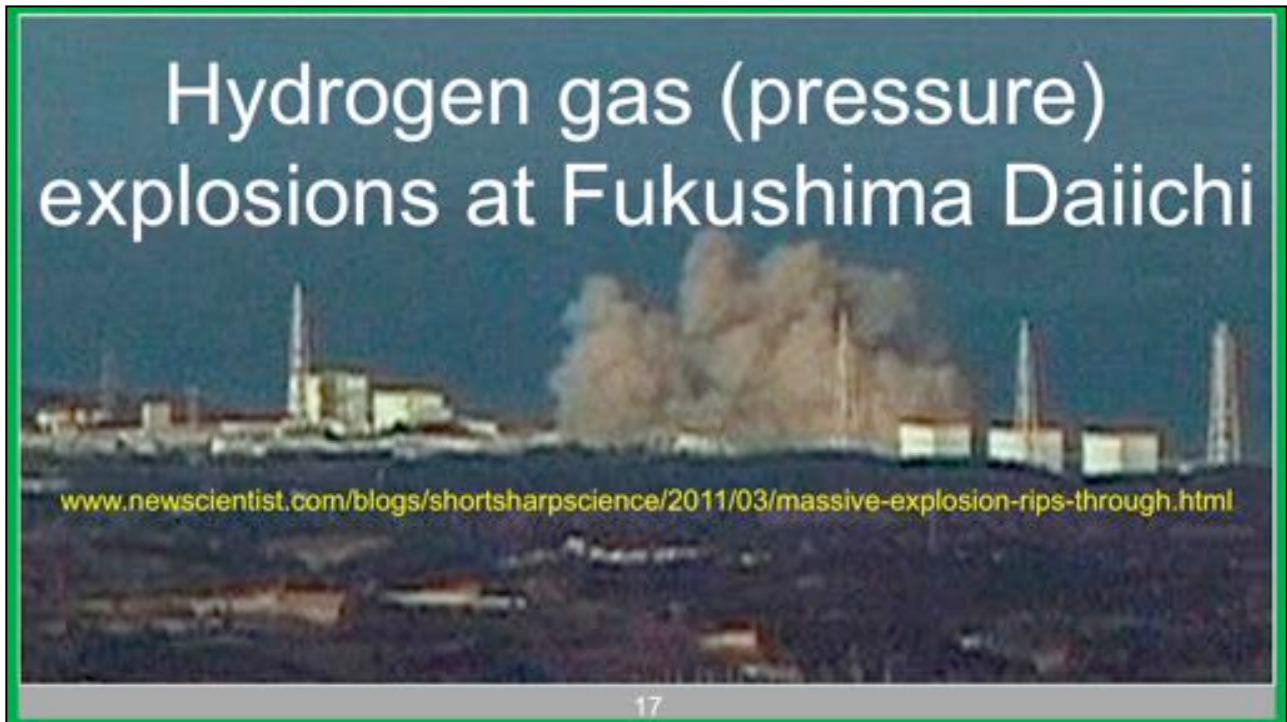
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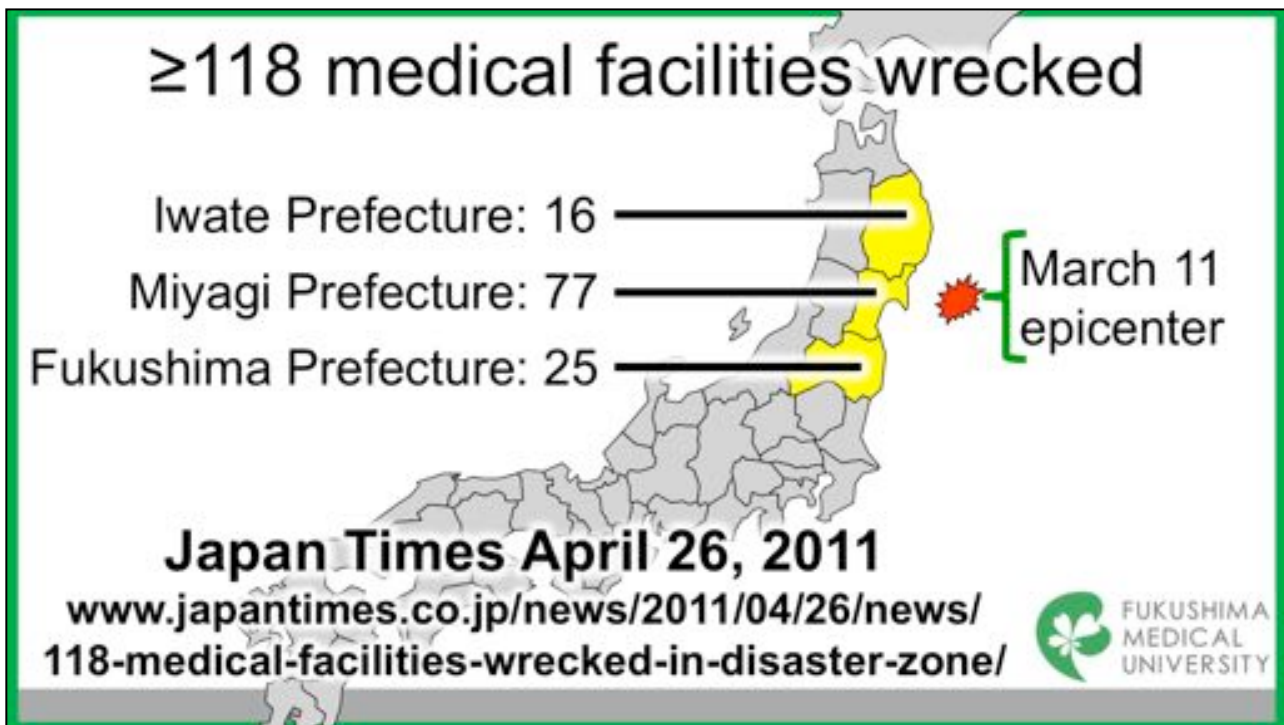
Back on the coast, ALL affected nuclear facilities went into automatic shutdown.



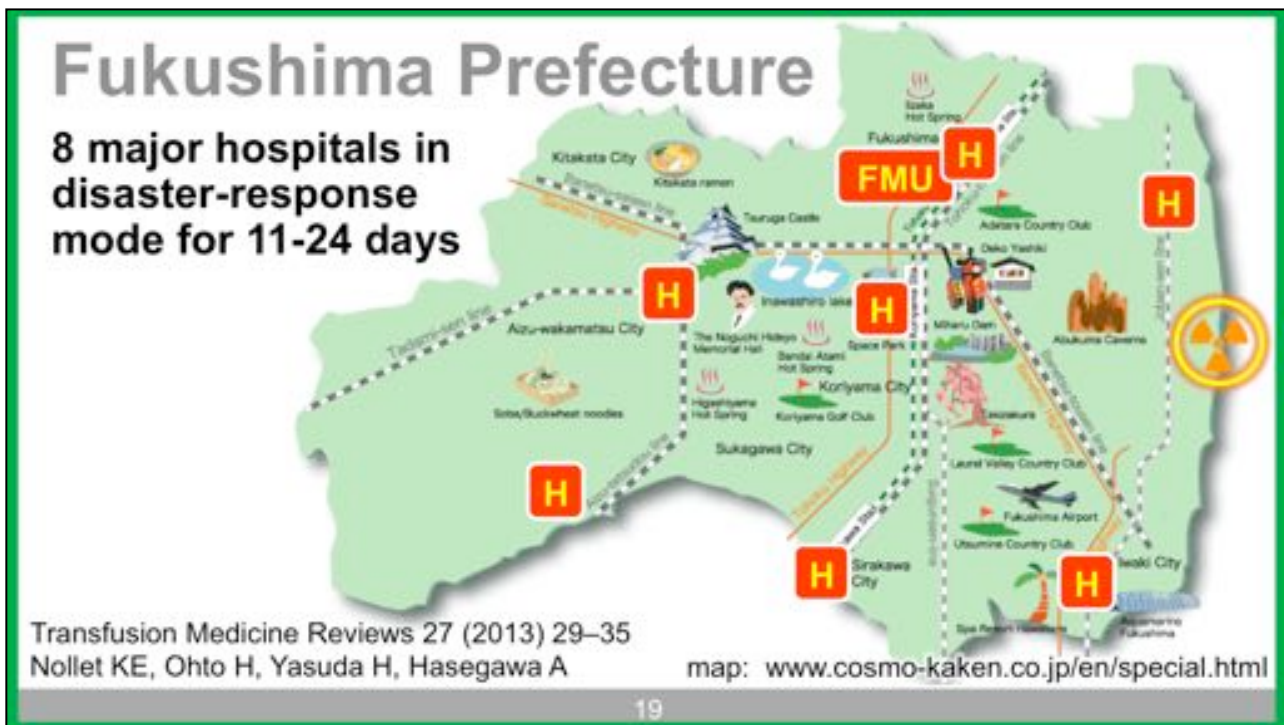
But power is needed to control core temperatures. Fukushima Daiichi lost all three sources of backup power: grid lines feeding back into the plant were taken out by the earthquake. Batteries and generators were flooded by the tsunami...



...resulting NOT in a nuclear explosion, but rather, gas pressure explosions that released a large quantity of radioisotopes. Evacuation of nearby residents was already underway.



In fact, everything along the coast was vulnerable, and at least 118 medical facilities became unusable. ***This*** is central to the matter of preventing morbidity and mortality in the days, weeks, and months that follow a disaster.



Eight major hospitals in Fukushima Prefecture, including ours, were specially designated for disaster response, anywhere from 11 to 24 days, during which routine outpatient appointments and elective surgeries were postponed.

NOTE:

Fukushima Prefecture includes 59 municipalities (cities, towns, and villages). Eight disaster response hospitals were designated in 7 municipalities: Minami Soma City Hospital (Minami Soma City), Iwaki Kyoritsu Hospital (Iwaki City), FMU Hospital and Fukushima Red Cross Hospital (Fukushima City), Shirakawa Kosei General Hospital (Shirakawa), Ohta General Hospital Foundation–Nishinouchi Hospital (Koriyama), Aizu Central Hospital (Aizu-Wakamatsu), and South Aizu Hospital (Minami Aizu).

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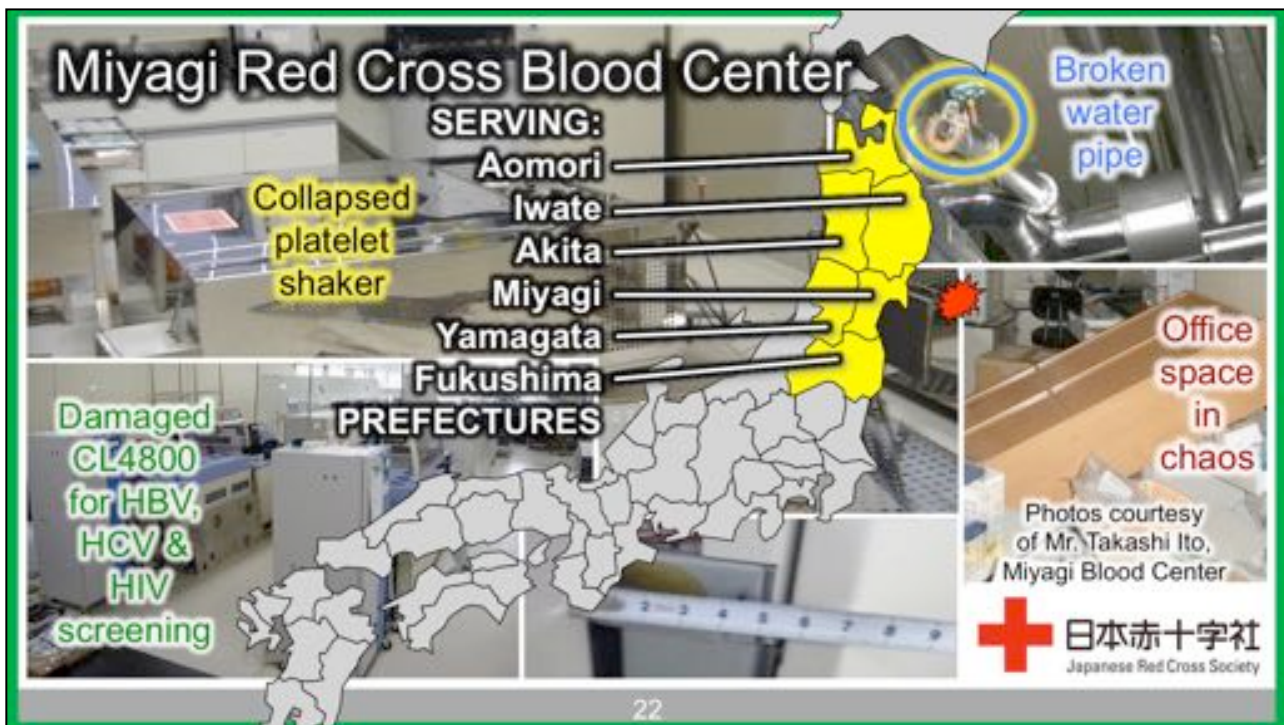


It was a busy time, with many civilian and Self Defense Force ambulances coming and going.

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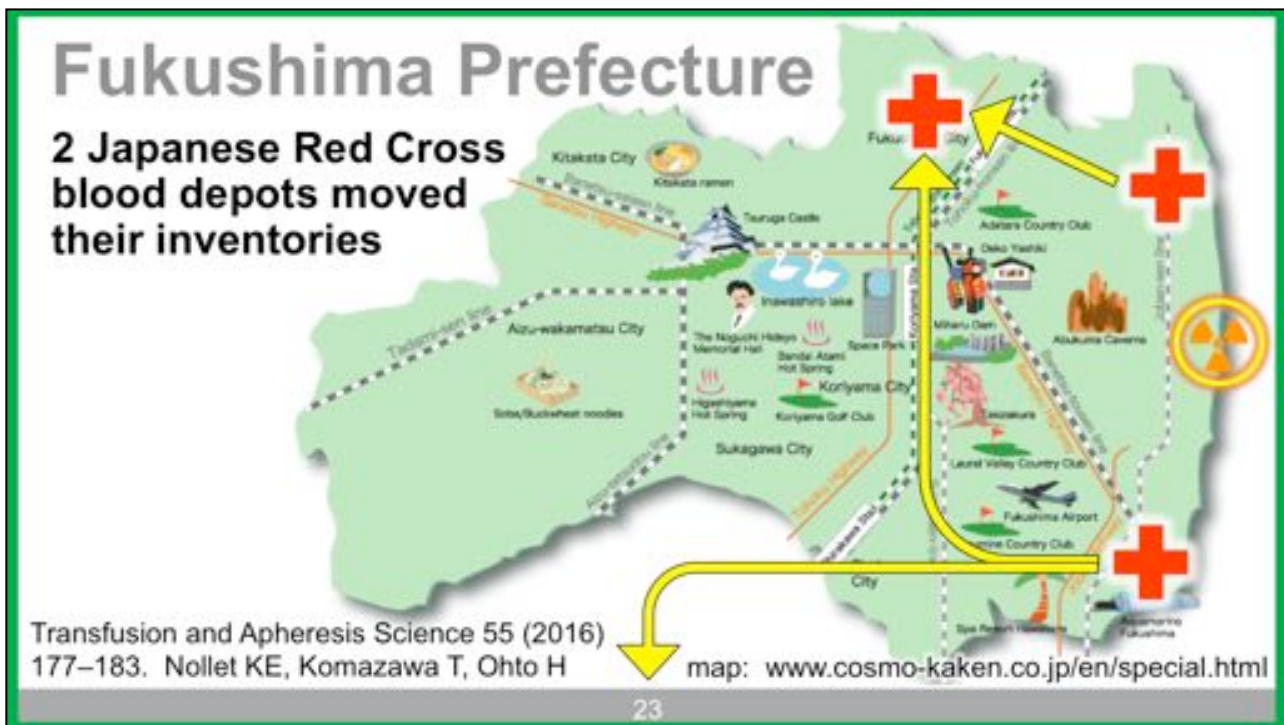
Our hospital was operational, but office space was in chaos. One American guy thought it was convenient to have a laser printer on top of a 4-drawer filing cabinet. In retrospect, no, but the printer, made in Japan, still works.



A hundred kilometers north of FMU, Miyagi Red Cross Blood Center also had office space in chaos.

They were not hit by tsunami, but partially flooded by a broken water pipe in the ceiling. Platelets for transfusion were lost when the platelet shaker collapsed. Modules of an infectious disease screening system were torn apart, rendering the system inoperative.

Just one blood center, yes, but Miyagi is responsible for testing blood from all six prefectures of Tohoku. Remote samples would normally come through the now-flooded Sendai Airport.



What about blood already in storage? Radiation anxiety may have influenced Red Cross decision-making. Two blood depots near the coast, including one in the 20-30 km band around Fukushima Daiichi, had their inventories transferred.

Products ready for transfusion were moved to Fukushima City. Frozen plasma still in quarantine was moved to a blood center in Kyushu.

Early blood banks were in hospitals

❖ 1935: Mayo Clinic

❖ 1937: Cook County

Moore SB: A brief history of the early years of blood transfusion at the Mayo Clinic: the first blood bank in the United States (1935).
Transfusion Medicine Reviews 2005; 19(3):241-5.

Ramsey G, Schmidt PJ: Transfusion medicine in Chicago, before and after the "blood bank"
Transfusion Medicine Reviews 2009; 23(4):310-21.



Historically, blood banks were based in hospitals. Mayo Clinic established America's first hospital blood bank in 1935, followed by Cook County Hospital in Chicago, where the name "blood bank" was coined by Hungarian immigrant Dr. Bernard Fantus.

Japanese Red Cross Blood Service

- ❖ 116 regular blood delivery vehicles
- ❖ 627 emergency blood delivery vehicles
- ❖ Want blood?
 - ❖ Roads and fuel
 - ❖ Air transportation
 - ❖ Electricity and water
 - ❖ Communication



Transfus Med Rev 2013; 27(1):29-35

25

Autologous blood programs are still common in Japanese hospitals. These are for collecting and holding patient's own blood in advance of elective surgery, but everything else in Japan is managed by Red Cross. As you saw, their Miyagi center could not test blood. Collecting and distributing were also problematic. If you want blood, you need roads and fuel, air transportation, electricity, water, and communication.

“Blood transfusion was the most common procedure performed during hospitalizations in 2011 (12% of stays with a procedure); the rate of hospitalizations with blood transfusion more than doubled since 1997.”

Healthcare Cost and Utilization Project
www.hcup-us.ahrq.gov/reports/statbriefs/sb165.pdf



This matters, because blood transfusion is the most common procedure performed in hospitals, not only for cancer or chronic diseases. Trauma should come to mind when you hear the word “earthquake.”

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今回、血液ドナー検査を行うにあたり、HIV抗体検査を実施する必要があることの説明を受け、その意義を理解いたしました。また、検査結果についても、プライバシーの保護が厳密に行われることを理解しました。

1. HIV抗体検査の必要性について
 2. 検査同意の撤回について
 3. 連絡先について

(説明)
説明年月日：平成 23 年 3 月 14 日
説明医：(自筆署名、もしくは記名押印)
菅野 隆浩

(同意)
同意年月日：平成 23 年 3 月 14 日
同意者(本人)：(自筆署名、もしくは記名押印)*
ノレット ケネズ

Emergency Donor
Testing Consent

Physician:
KANNO Takahiro

Donor:
NOLLET Kenneth

27

So FMU prepared to step back in time and run our own blood bank for emergency transfusion. Here is paperwork from March 14, for staff who volunteered to be emergency donors. In this case, the attending physician was Dr. Kanno, and I was the prospective donor, consenting to infectious disease testing.



Our testing technology is different from the Red Cross, but we maintain the same ability to irradiate blood components to prevent transfusion-associated graft-versus host disease.

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GRAFT-VERSUS-HOST DISEASE : INTRODUCTION AND PROSPECT

HITOSHI OHTO¹⁾, HITOSHI SUZUKI²⁾, and RIKIYA ABE³⁾

¹⁾*Blood Transfusion Service, Fukushima Medical College, Fukushima,*

²⁾*Departments of Pediatrics Fukushima Medical College, Fukushima,*

³⁾*Surgery II, Fukushima Medical College, Fukushima*

(Received August 7, 1992)

Fukushima J. Med. Sci.
39(2) 63-67, 1993

Abstract : In order to devise the way of prevention and the progress in the treatment of transfusion-associated graft-versus-host disease (TA-GVHD), this issue is published as the results of the symposium on GVHD at Fukushima Medical College, 1992.

HLA analyses of TA-GVHD forced us to alter our concept of mechanism of this disease. As one-way matching in HLA from donor to recipient is important in developing the TA-GVHD, transfusions between relatives are most hazardous and there is a higher risk even unrelated donors in Japanese.

→ Prophylactic irradiation of blood components is the method of inactivating immunocompetent lymphocytes and is nowadays the most effective in preventing the TA-GVHD. ← we will have leukocyte depletion filters of next generation and ultraviolet irradiation on platelet concentrates as alternative to irradiation.

FMU Hospital
introduced
universal
irradiation of
allogeneic
RBCs & PLTs
in 1988.



In fact, FMU was the first institution in the world to introduce universal irradiation of allogeneic blood for transfusion. It is now the standard of care in Japan...

HLA one-way match risk for TA-GVHD

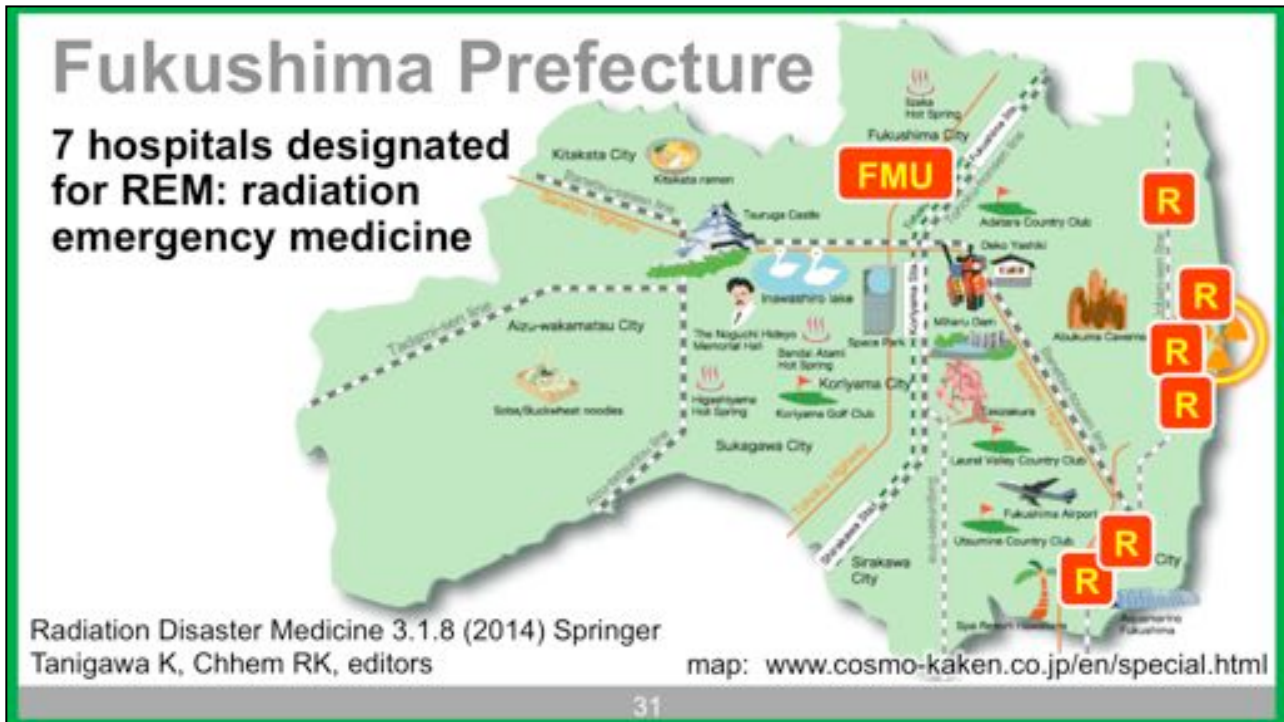
Country	Random	Parent to Child	
Japan	1:7981	1:623	RR = 12.8
US (whites)	1:39,034	1:1,823	RR = 21.4
Spain	1:175,296	1:3,587	RR = 49.0

Wagner FF & Flegel WA. Transfusion-associated graft-versus-host disease: risk due to homozygous HLA haplotypes. *Transfusion* 1995; 35(4):284-91.

30

...because the risk of an HLA one-way match is especially high among Japanese.

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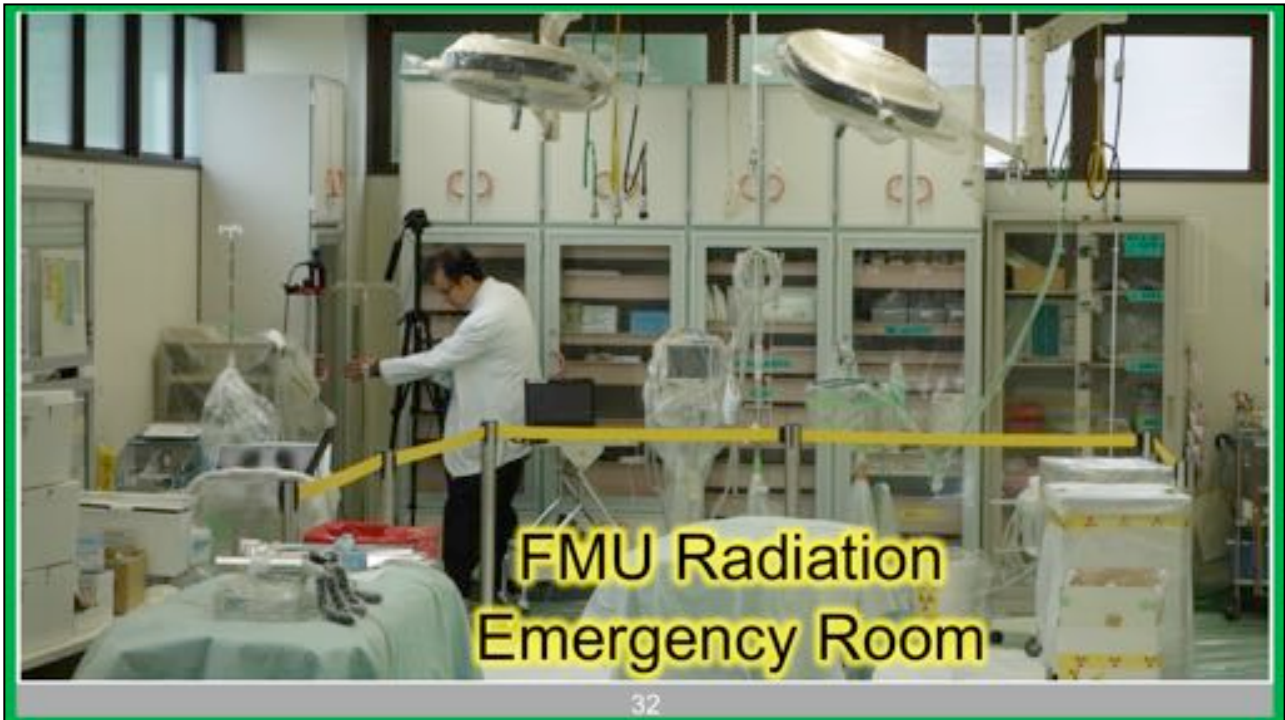


Speaking of radiation, seven hospitals in Fukushima Prefecture, including FMU, were already designated as Radiation Emergency Medicine facilities. In theory, the 6 coastal ones closest to our 2 nuclear plants were primary responders, and FMU was secondary. In practice, FMU provided primary and secondary radiation emergency care.

NOTE:

Designated Radiation Emergency Medicine (REM) facilities:
FMU, Futaba Kosei Hospital, Fukushima Prefectural Ohno Hospital, Minami Soma City Hospital, Imamura Hospital, Iwaki Kyouritsu Hospital, and Fukushima Rosai Hospital.

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Here is our radiation emergency room, built as part of a nationwide response to the 1999 Tokaimura criticality accident.

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Portable decontamination facilities were added as the Fukushima Daiichi crisis unfolded.



Colleagues responsible for decontamination had to worry about having enough water. FMU keeps a 4-day reserve, but earthquake damage to the municipal water supply would take 7-8 days to repair, so extreme conservation was necessary. Laboratory procedures were modified wherever possible. Chemical toilets were set up outside for employees, volunteers, and able-bodied visitors. Personal hygiene was improvised with alcohol-based sanitizers.

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Chairs in our hospital lobby were replaced with beds and, yes, some emergency care took place, but the worst-case scenario we prepared for did not happen.



Extra staff were deployed to welcome people, then ask:

Did they come for a radiation exposure check? If that was the only concern, they were redirected to a screening center in Nihonmatsu, about 15 km away.

Did they come for a regular appointment or elective surgery? These were postponed to accommodate urgent and emergency care. Eliminate elective surgery and you eliminate a lot of transfusion.

People with urgent or emergent needs were promptly admitted.




Ground and air ambulances didn't just bring critical patients in, they transferred chronic patients out. This also reduced transfusion demand.

Our students' soccer field became a second helipad, with as many as 5 helicopters on the field at once.

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	Red Cross	FMU	Minami Soma	South Aizu	Ohta Nishino uchi	Iwaki Kyo ritsu	Shira kawa Kosei	Aizu Central
Beds	359	778	230	150	1029	828	471	898
Acute Phase Until	4/3	4/1	4/1	4/1	3/31	3/27	3/21	3/21
Days	24	22	22	22	21	17	11	11

Nollet KE, Ohto H, Yasuda H, Hasegawa A. The great East Japan earthquake of March 11, 2011, from the vantage point of blood banking and transfusion medicine. *Transfus Med Rev* 2013; 27(1):29-35.



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38

Here are the 8 specially designated emergency response hospitals, including FMU with 778 beds. We were in emergency response mode until April 1, a total of 22 days.

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4743 Beds	Patients Transfused			Units Transfused		
	pre	post	%	pre	post	%
Total	635	457	72	8631	5455	63
RBC	530	392	74	2685	1938	72
FFP	96	37	39	961	502	52
PLT	166	106	64	4995	3015	60

Nollet KE, Ohto H, Yasuda H, Hasegawa A. The great East Japan earthquake of March 11, 2011, from the vantage point of blood banking and transfusion medicine. *Transfus Med Rev* 2013; 27(1):29-35.



39

All 8 hospitals add up to 4743 beds. Comparing each hospital's emergency response period to the same number of days prior to 3.11, we can see that the number of patients transfused was lower, and the number of units transfused was lower still. A nationally coordinated response by the Red Cross met the demand, in part because this was a disaster of mass fatality rather than mass injury.

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FMU's disaster response included hospital-wide meetings with participants from every department. Please notice our man in the lower right, holding dashboard placards for permission to be on the road and permission to buy gasoline. These placards had to be shared. Speaking of sharing, In front of him is a tray of rice balls. Available food would vary from one meeting to the next, but the general idea was to divide it up so every representative could bring something back to his or her colleagues.

Communication

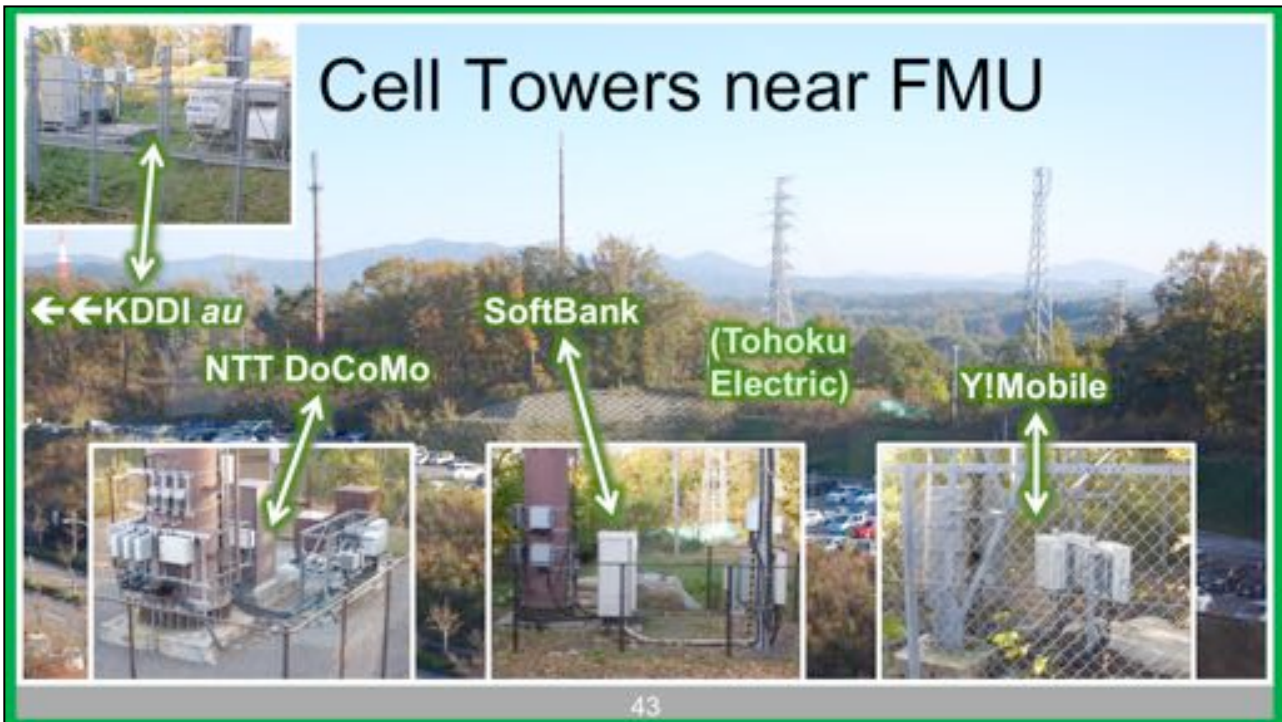
- ❖ Hospital-Wide Meetings
 - ❖ 3/day, then 2/day, then 1/day
 - ❖ Effective in Japan
- ❖ Inter-Institution Communication
 - ❖ Phone? Fax? Internet?



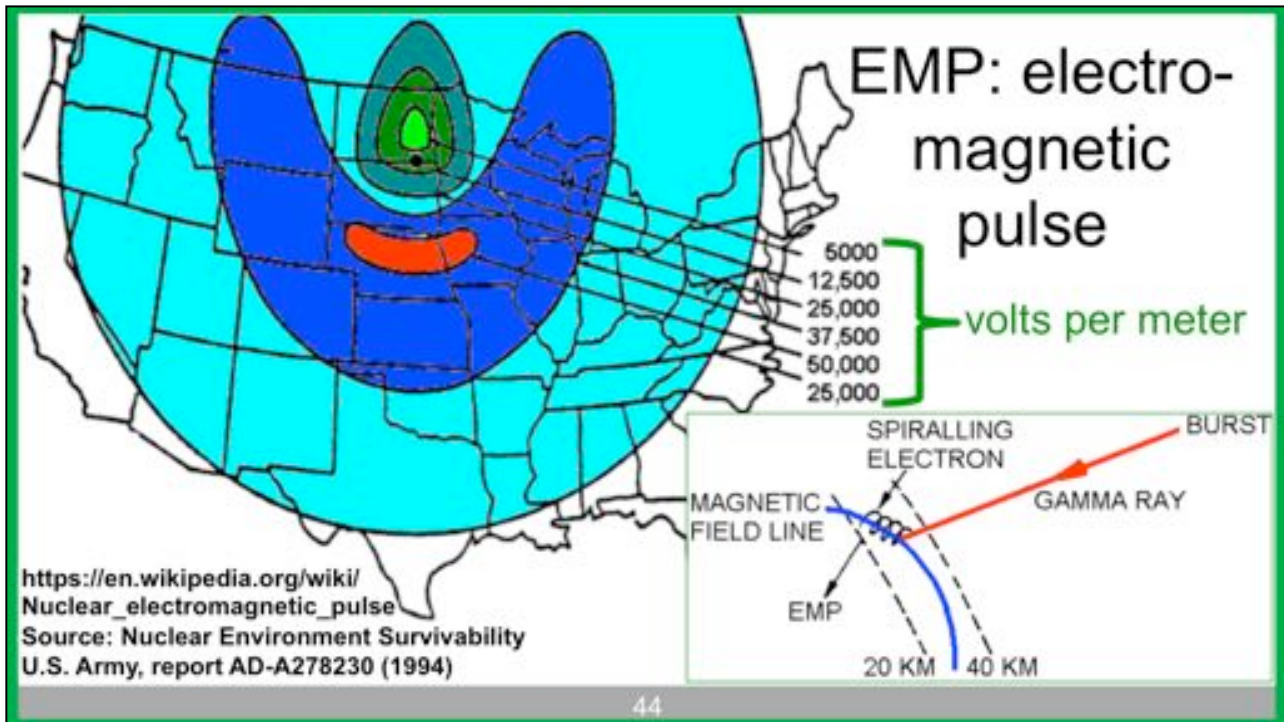
Hospital-wide meetings initially convened three times per day: 9 in the morning, 3 in the afternoon, and 9 at night. Then twice a day and finally once a day as our situation improved. This was effective, but what about inter-institutional communication?



Telephones have come a long way from Bell to Cell. What we hold in our hands is smaller and lighter, but the infrastructure is still heavy, even if we've cut out some wires.



Three of Japan's four wireless carriers have cell towers across the street from FMU, and the fourth one has a tower on the far side of our heliport. Equipment varies from one tower to the next, but even if they all had backup power and were hardened against electromagnetic pulse, the weak link is in our hands.



Just to remind you, an electromagnetic pulse happens when gamma rays from a nuclear explosion kick electrons out of atmospheric gas molecules and those electrons spiral around under the influence of the earth's magnetic field. This induces high volts-per-meter gradients that can damage unprotected electronic devices.

A Makeshift Faraday Cage

As Amateur Radio operators, we're supposed to be able to communicate in emergencies. But if there's ever a substantial electromagnetic pulse (EMP), whether from nature or from some enemy, our radios will be useful perhaps as paperweights, but nothing else. We need to protect our equipment — and I found a way to do it simply and on the cheap.

I keep my handheld transceiver and an extra charged battery in a plastic (therefore non-conductive) bucket with the metal handle removed. I put the entire package in a small, all-metal pail (see Figure 1). After I ensured that nothing extended past the plastic bucket to the pail's metal, I put the pail's cover on, and the inside was sealed. I believe this may serve as a Faraday cage, which should protect any electronic equipment from the effects of an EMP.

Figure 1 — A makeshift Faraday cage constructed from a plastic bucket inside a metal pail.



45

Amateur Radio operators are catching on to this and improvising Faraday cages to shield communication equipment when not being used.

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My approach is to have two cell phones through Japan's two biggest carriers, whose towers are on two different hills. The smartphone also contains a terrestrial television receiver. My other phone is not so smart, but like every Lake Wobegon child is above average; its battery life is also above average, too.

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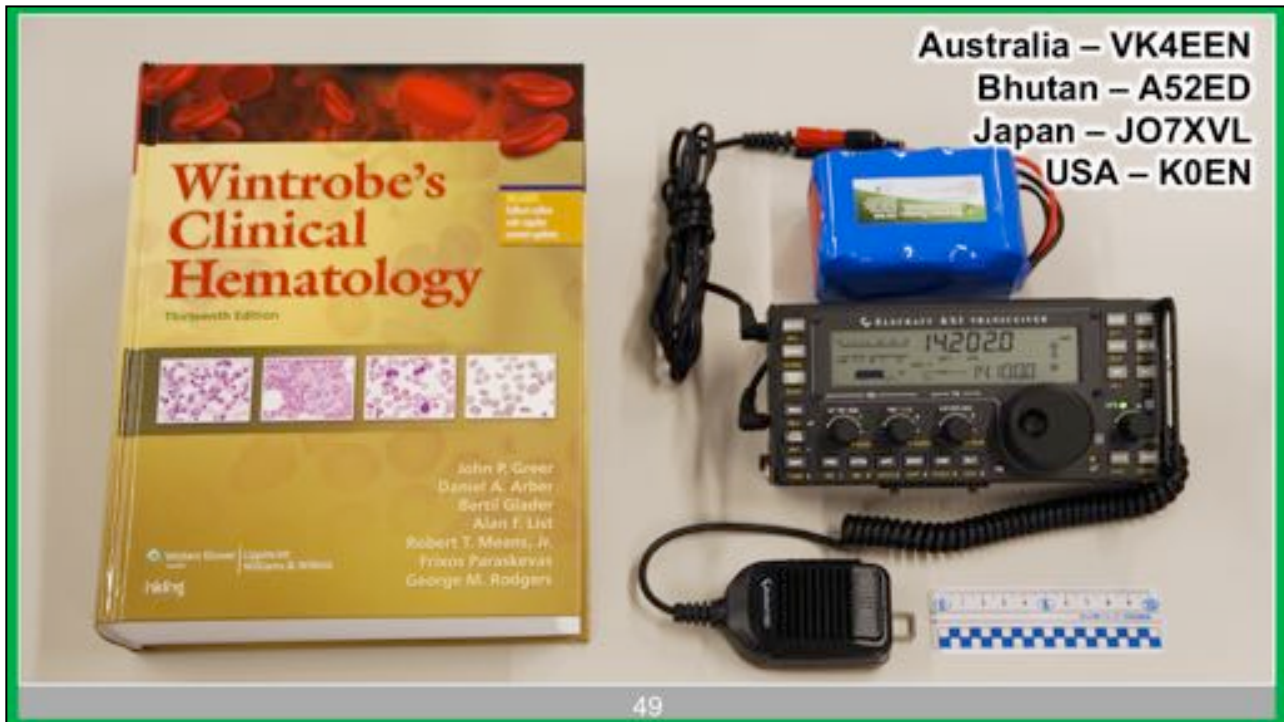
And, yes, I've earned Amateur Radio licenses in various countries.

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Because you never know when a telephone will misbehave.

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To use a medical textbook as a calibration standard, a lot of Amateur Radio shortwave equipment is bigger and heavier, but equipment that is lighter and smaller can still be used for long-distance communication without needing cell towers or other infrastructure. Hematology on the left, and a ruler in the lower right to remind you I'm a pathologist.


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Transfusion and Apheresis Science 49 (2013) 422–427

Contents lists available at [ScienceDirect](#)

 **Transfusion and Apheresis Science** 

journal homepage: www.elsevier.com/locate/transci

When all else fails: 21st century Amateur Radio as an emergency communications medium  CrossMark

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50

Now, when someone with grey hair publishes about Amateur Radio, you might suspect an old guy reminiscing about his childhood technology avocation.

Keeping Communications Flowing During Large-scale Disasters: Leveraging Amateur Radio Innovations for Disaster Medicine

Victor H. Cid, MS; Andrew R. Mitz, PhD; Stacey J. Arnesen, MS

Disaster Information Management Research Center, Specialized Information Services Division, National Library of Medicine, Bethesda, Maryland (Mr Cid and Ms Arnesen); Laboratory of Neuropsychology, National Institute of Mental Health, National Institutes of Health, Bethesda, Maryland (Dr Mitz).

Correspondence and reprint requests to Victor H. Cid, 6707 Democracy Boulevard, Suite 440, Bethesda, MD 20892 (email: victor.cid@nih.gov).

Disaster Med Public Health Prep. 2017 Sep 25:1-8. doi: 10.1017/dmp.2017.62.

But when mid-career people at the National Library of Medicine and National Institutes of Health publish, maybe we should pay a little more attention...

Keeping Communications Flowing During Large-scale Disasters: Leveraging Amateur Radio Innovations for Disaster Medicine

Victor H. Cid, MS; Andrew R. Mitz, PhD; Stacey J. Arnesen, MS

This research was supported by the Department of the Navy, the National Naval Medical Center/Walter Reed National Military Medical Center, the Intramural Program of the National Institutes of Health, the NIH Radio Amateur Club, and the National Library of Medicine.

Correspondence and reprint requests to Victor H. Cid, 6707 Democracy Boulevard, Suite 440, Bethesda, MD 20892 (email: victor.cid@nih.gov).

Disaster Med Public Health Prep. 2017 Sep 25:1-8. doi: 10.1017/dmp.2017.62.

...especially when their research was supported by the Navy and Walter Reed.



And when a distinguished Yale professor puts his money where his microphone is to endow a Collegiate Amateur Radio Initiative, yes, we're on to something.

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Not to be
outdone
by Yale:



William E. Collins shared a link to the group: ARRL Collegiate Amateur Radio Initiative.
7 hrs · Miami Beach, FL, United States · 🌐

Newly announced Harvard President is Lawrence S. Bacow, KA1FZQ!!!

www.facebook.com/groups/ARRLCARI/

www.thecrimson.com/article/2018/2/12/bacow-to-serve-as-29th/

BREAKING: BACOW TO SERVE AS HARVARD'S 29TH P.
Harvard Corporation member Lawrence S. Bacow will serve as the University's ...
THE CRIMSON.COM

Like Comment Share

54

Not to be outdone by Yale, Harvard just elected Amateur Radio operator KA1FZQ as their next president.

“Amateur Radio needs to have a bigger impact in this age of cell phones and digital communications.”

Edward L. Snyder, MD

Professor of Laboratory Medicine; Associate Chair, Clinical Affairs;
Director, Apheresis/Transfusion Service; Director, Blood Bank;
Director of Membership, Yale Cancer Center; Editor, Lab News

<http://w1yu.sites.yale.edu/news/dr-ed-snyder-endows-arri-collegiate-amateur-radio-initiative>

55

Yale’s Professor Snyder is a relative newcomer to Amateur Radio who saw that it needs to have a bigger, not smaller, impact in the age of cell phones and digital communications.

Radio Amateurs in Japan Keep Providing Communications Support in Earthquakes' Aftermath

Amateur Radio operators became involved in the rescue effort soon after the March 11 9.0 earthquake and devastating tsunami — now known as *Higashi Nihon Daishinsai* or The Eastern Japan Great Earthquake Disaster — that hit Japan, and that effort continues nearly two months later. “In the early stage following the earthquake and tsunami, several radio amateurs were able to activate their stations with car batteries or small engine generators, despite the electric power outages,” IARU Region 3 Secretary Ken Yamamoto, JA1CJP, told the ARRL. “They transmitted rescue requests and information on the disaster situation — including refugee centers and their needs — and the availability of basic infrastructures, such as electricity, water and gas supplies.” After the earthquake and tsunami, there was no electricity, water or gas service in many of the affected areas.



This map shows the March 11 earthquake and its associated aftershocks through March 14, 2011 at 11:20 PM JST. The size of the circles is a function of magnitude and the color indicates the date: March 11, light green; March 12, yellow; March 13, orange, and March 14, red.

Keen SK. QST 95(6)77, 2011.

56

We saw this firsthand. Communication infrastructure was destroyed along our coast, and networks were overloaded as far away as Tokyo.

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I'll mention here that public health departments in the United States usually communicate with the Centers for Disease Control by Internet and telephone, but my home state maintains shortwave radio links with the CDC as well.

NOTE: MDH photos from 2015-10-20 site visit with William Schmidt, WB0LZR, Tactical Communications Coordinator & ARMER Systems Administrator, Minnesota Department of Health, Public Health Emergency Preparedness Section



Now back to the 38th parallel, which nominally divides North and South Korea.



It's hard to get a clear view of what goes on inside the Hermit Kingdom.

This year's nuclear and missile tests

April
A test at some of the significant nuclear and missile tests by North Korea this year.

Feb. 12
North Korea conducts its first known test of a new midrange ballistic missile it calls the Pukgukong-2, a land-based variant of an earlier developed submarine-launched missile. The missile uses solid fuel, which makes it easier to move and launch on short notice compared to weapons using liquid fuel.

May 14
North Korea premier a newly developed intermediate range missile, Hwasong-12, which it says is designed to carry a heavy nuclear warhead. The flight test is conducted at a highly lofted angle to reduce range and avoid other countries. The North says the missile traveled 787 km (489 miles) and reached a maximum altitude of 2,111 km (1,310 miles).

May 21
North Korea conducts another test launch of the Pukgukong 2 and later declares its missile ready for mass production and operational deployment. The missile flew about 100 km (110 miles) and reached a height of 360 km (220 miles) before crashing into the sea.

July 4
North Korea conducts its first flight test of an ICBM, the Hwasong-14, launching it in a highly lofted trajectory. North Korea says the supposedly nuclear-capable missile reached a height of 2,802 km (1,740 miles) and flew 955 km (593 miles) for 39 minutes before falling into the sea. North Korean leader Kim Jong Un expresses delight at the successful test, saying that the United States would be depressed by the North's "package of gifts" delivered on the U.S. Independence Day.

July 28
North Korea conducts its second test of the Hwasong-14 ICBM, which it says reached a maximum height of 3,725 km (2,314 miles) and traveled 998 km (620 miles) before apparently landing in waters off Japan. The North says the test was aimed at confirming the maximum range and other technical aspects of a missile capable of delivering a "large-sized, heavy nuclear warhead." Kim says the nighttime launch displayed the country's ability to fire at "random regions and locations at random times" with the "entire" U.S. mainland in its nuclear range.

Aug. 29
North Korea launches a Hwasong-12 intermediate range missile from its capital Pyongyang. It flew over Japan before plunging into the northern Pacific Ocean, a change from North Korea's pattern of firing missiles at highly lofted angles. South Korea's military says the missile traveled around 2,700 km (1,678 miles) and reached a maximum height of 350 km (217 miles). The launch came weeks after North Korea threatened to launch a salvo of Hwasong-12s that would surround Guam with "erringing" missile fire. Kim calls the launch a "momentous probe" so concerning Guam and called for his military to conduct more tests targeting the Pacific Ocean.

Sept. 3
North Korea carries out its sixth and most powerful nuclear test to date, claiming it was a hydrogen bomb designed for use on ICBMs. It says the test was a "perfect success" and a further step in the development of weapons capable of striking anywhere in the United States.

Sept. 15
North Korea launches another Hwasong-12 missile over Japan into the Pacific. The missile flew about 3,700 km (2,300 miles), marking it the country's longest missile flight. Kim says his country is nearing its goal of "equilibrium" in military force with the United States.

Nov. 29
North Korea's military said the latest missile fired from an area near Pyongyang traveled 960 km (596 miles) and reached a height of 4,500 km (2,796 miles). This demonstrates a potential operational range of 13,000 km (8,100 miles), which would put Washington, D.C., and all other parts of the continental United States comfortably within reach, according to U.S. analyst David Wright.

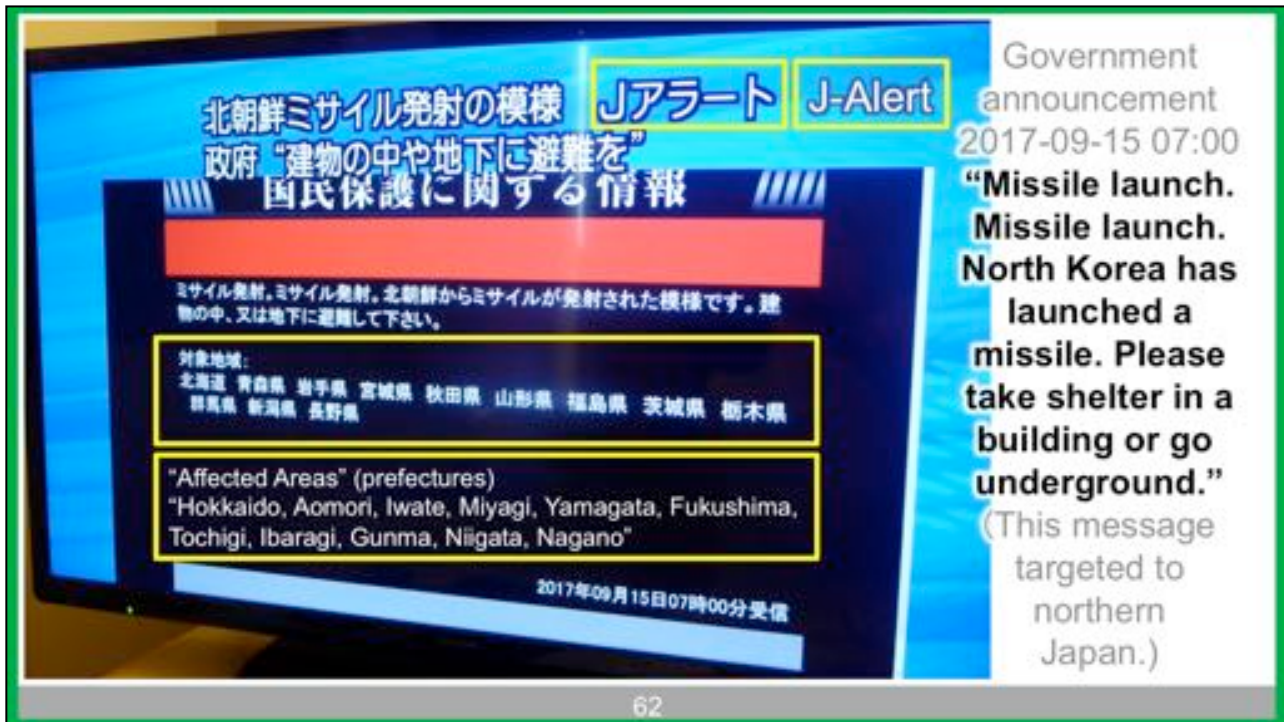
the japan times
The New York Times
THURSDAY, NOVEMBER 9, 2017

60

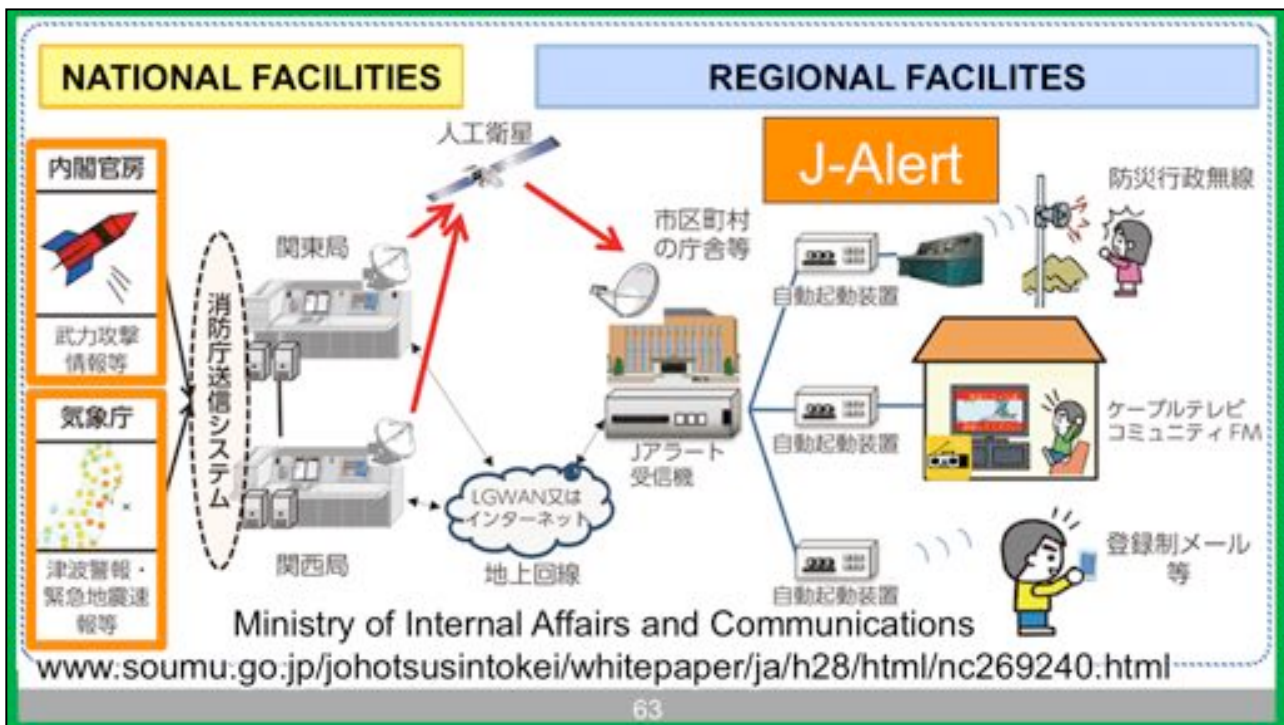
But we can detect their nuclear detonations and missile launches. Let me call your attention to August 29 and September 15.



Early morning August 29, my Japanese smart phone dutifully lit up with an Emergency Alert. "Missile launch. Missile launch. North Korea has launched a missile. Please take shelter in a strong building or underground."



I was in a Tokyo hotel room on September 15 when a similar message lit up the TV screen.



Smartphone, television, and community FM broadcasters are part of Japan's J-Alert system, which combines national and regional facilities. J-Alert is mostly used for natural disasters, but has been adopted, and adapted, for threats coming from North Korea.



Outdoor public address systems are also integrated into the J-Alert system.



What about South Korea? Seoul is only 35 miles from a hostile border. Technically, the two sides are still at war.



Here is a close-up of an emergency supply cabinet typically found in subway stations, along with instructions for using a chemical, biological and radiological gas mask.

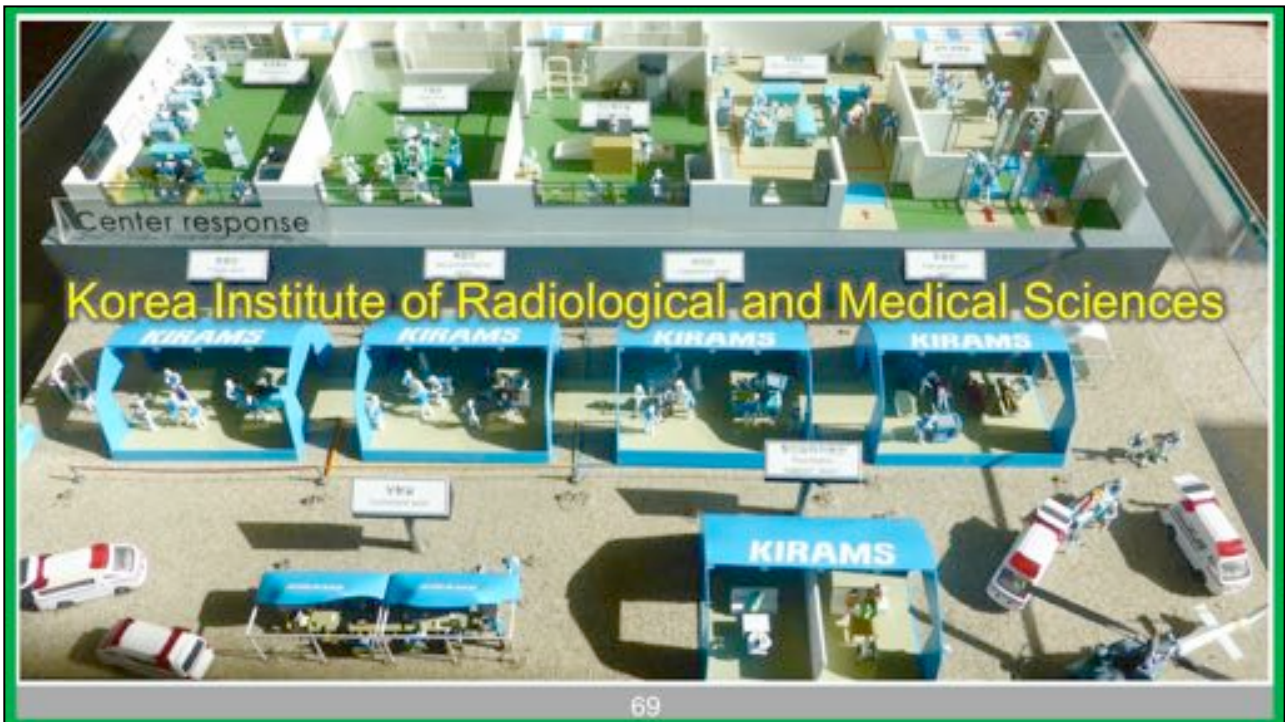


Not only subway stations, but also shopping centers and other public accommodations keep emergency equipment in plain view.



You can also spot CBR detection equipment.

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This model shows emergency activities of KIRAMS, the Korea Institute of Radiological and Medical Sciences. We are learning from our Korean cousins.

Hematology in **Hell** and High Water

Medieval descriptions of Hell
foretell the terror of
nuclear fission out of control.

70

Back to the question of Hell, medieval descriptions foretell the terror of nuclear fission out of control, so the plant workers who put the good of many over the good of a few deserve our eternal gratitude.

Hematology in **Hell** and High Water

What about the devil-eat-devil Hell
described by C.S. Lewis,
where people live
selfishly?

71

What about the devil-eat-devil Hell described by C.S. Lewis, where people live selfishly?

NOTE: <http://www.cslewis.com/heaven-and-hell-as-idea-and-image-in-c-s-lewis/>

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Fukushima citizens had to stand in line to get water from trucks until our municipal system was repaired. These were peaceful lines. Anywhere else in the world, it's hard to queue for the latest iToy without some skirmish breaking out. And let's not talk about Black Friday.

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There's a home in my neighborhood where three generations live under one roof. The grandparents' restaurant mainly delivers hot meals to the university. There's also this lunch counter. After the earthquake, they said, "Look, with no running water, city gas, or gasoline, we're out of business. But you come here every night, and sit at our family table." To paraphrase an ancient proverb, a little bit shared peacefully is better than a feast in conflict. As close as we may have been to a nuclear hell, we were far, far away from the hell of C.S. Lewis.

Summary

- ❖ Fukushima reminds us that nuclear accidents did not end with Chernobyl, and any nuclear event may be part of a compound disaster.
- ❖ North Korea reminds us that nuclear weapon threats did not end with the cold war.
- ❖ Let's all remember that we can prepare, and everyone has a role.



In summary...

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Thank you for your attention.

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One more description of hell...

Author unknown, but found at:

<https://medium.com/personal-growth/13-things-you-need-to-give-up-if-you-want-to-be-successful-44b5b9b06a26>



“On your last day on earth,
the person you became
will meet the person
you could have become.”

—Anonymous

