



EHSSSENTIALS 2018

Environmental, Health & Safety Symposium for Healthcare

November 14, 2018
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Emerging Risks and Control Strategies: Nitrous Oxide in Labor and Delivery

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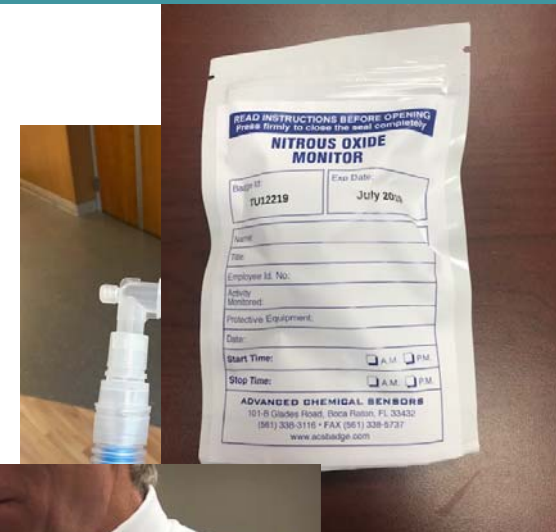
New and Emerging Risk: Beyond the Operating Room

- Nitrous Oxide alternative for pain management for laboring mothers
 - Newer practice in the United States
- Patient administered delivery system
 - Demand only
- Other applications
 - Dental Operator
 - Emergency Departments
 - Oncology Units



Nitrous Oxide

- Physical and Chemical Properties
- Exposure Routes
- Acute and chronic exposure risks
- Occupational Exposure Limits
 - PEL – none
 - REL – 25ppm
 - TLV – 50ppm



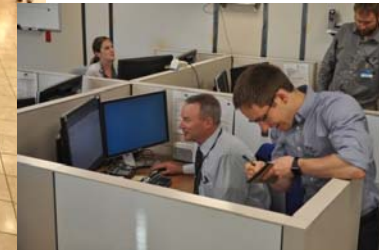
Pre-implementation

- Multidisciplinary review
 - Nurse Manager, Safety, Employee Health, Facilities
- Review of health and safety risks
- Education
- Engineering Controls
- Administrative Controls
- Exposure monitoring plan



Onboarding and Exposure Monitoring

- No data collected for first 6+ months of use
- Low patient usage
- **EPIC Go Live**
- Exposure monitoring equipment available but...
 - Forgot
 - Too busy
 - Didn't know patient would use nitrous oxide
 - No identified concerns
 - Trusted engineering controls



The Badge...

Date	Badge #	Time	Minutes	Result (PPM)	TWA 8hr (PPM)
10/15/2017	TU4698	1044-1135	51	6.8	0.72
10/21/2017	TU4694	1830-1900	30	58.4	3.65

- Not expected
- Last 30 minutes of shift
- What if shift had continued?

Next Steps

- Discussion with manager and nurse
 - Equipment complications
 - Lack of understanding of risks
 - Lack of understanding on passive dosimeter
- Equipment review
- Ventilation review
- Needed more data
- Communication and risk management



Emerging Risks and Control Strategies: Nitrous Oxide in Labor and Delivery

Data Review

- 4 months and 33 passive dosimetry badges
- Exposure controlled below the OEL, but inconsistent
- Mayo Clinic Rochester data
 - Variables by site: air exchanges and source
- Patient variables
- Variables to other healthcare organizations

Date	Badge #	Time	Minutes	Result (PPM)	TWA 8hr (PPM)	
10/15/2017	TU4698	10:44-11:35		51	6.8	0.72
10/21/2017	TU4694	1830-1900		30	58.4	3.65
10/23/2017	TU4697	1000-1100		60	4.6	0.58
11/29/2017	TU4701	0255-0708		253	8.1	4.27
11/28/2017	TU4702	2013-2300		167	<0.8	<0.8
11/29/2017	TU8864	0700-0919		139	<0.9	<0.9
12/11/2017	TU8866	2049-2145		56	<2.0	<2.0
12/15/2017	TU8868	1915-0315		480	<0.3	<0.3
12/15/2017	TU8869	1300-1900		360	0.86	0.65
12/15/2017	TU8865	1135-1915		460	10.6	10.16
12/15/2017	TU8867	1325-1445		80	13.1	2.18
12/21/2017	TU8872	1615-1622		7	33.5	NA
12/21/2017	TU8870	0945-1510		325	6.4	4.33
12/21/2017	TU8873	2353-0650		417	2.1	1.82
12/21/2017	TU8871	11:00am-7:00pm		480	4.2	4.20
12/30/2017	TU9303	1535-1900		205	<0.6	<0.6
1/15/2018	TU9305	09:00-12:00		200	11.1	10.11
1/8/2018	TU9304	0645-1540		535	14.5	16.16
1/23/2018	TU9306	0330-0640		190	<0.7	<0.7
1/23/2018	TU9308	0330-0420		50	17.2	1.79
1/25/2018	TU9307	0250-0324		34	<3.5	<3.5
1/26/2018	TU9310	2020-0420		480	<0.3	<0.3
2/9/2018	TU9636	0030-0600		330	5.8	3.99
2/6/2018	TU9311	2112-0530		490	0.3	0.31
2/6/2018	TU9312	0533-0657		84	7.5	1.31
2/7/2018	TU9634	0905-1500		355	6.1	4.51
2/7/2018	TU9633	0910-1717		487	7.3	7.41
2/8/2018	TU9631	0245-0530		165	10	3.44
2/8/2018	TU9635	0230-0635		245	4.7	2.40
2/11/2018	TU9637	0703-1515		492	<0.3	<0.3
2/13/2018	TU9639	0120-0700		340	7.8	5.53
2/13/2018	TU9640	0104-0339		154.8	12.1	3.90
2/12/2018	TU9638	0504-0700		115.8	6.6	1.59

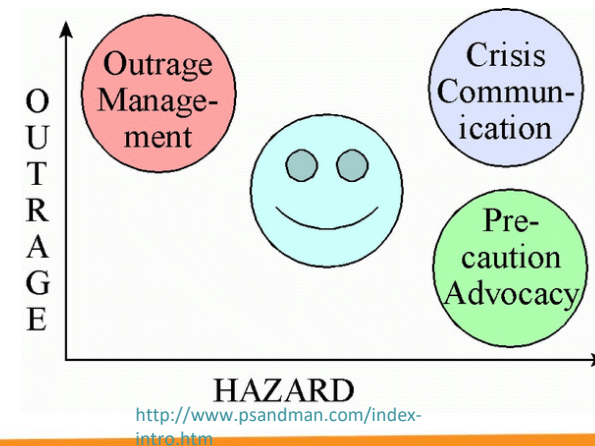
Opportunities to Reduce Exposure

- Establish best source for nitrous oxide
- Policy/procedure review for administration and staffing
- Ventilation changes
- Risk Communication

How nitrous oxide works

Here's how you use nitrous oxide during labor:

- In the delivery room, you hold a small mask over your mouth when you want to help lower your pain.
- When you breathe in, a valve opens to let the gas into your lungs. When you breathe out, the valve closes.
- You begin to feel the effects within one minute.
- The effects last until you remove the mask.
- Some women use nitrous oxide during contractions and others may also use it to help relax between contractions.



Learnings

- Trust but verify
- Human impact of a perfect process
- ALARA Program Management
- Importance of risk communication

Thank You

- Jeff Nesbitt, CIH
- Mike Squillace, CSP
- Matt Austin, CIH
- Family Birthplace Leadership and Staff

Emerging Risks and Control Strategies:
Radiopharmaceutical Therapy –
Lutetium 177

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Health Physicist – Mayo Clinic



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Emerging Risks and Control Strategies: Radiopharmaceutical Therapy – Lutetium 177

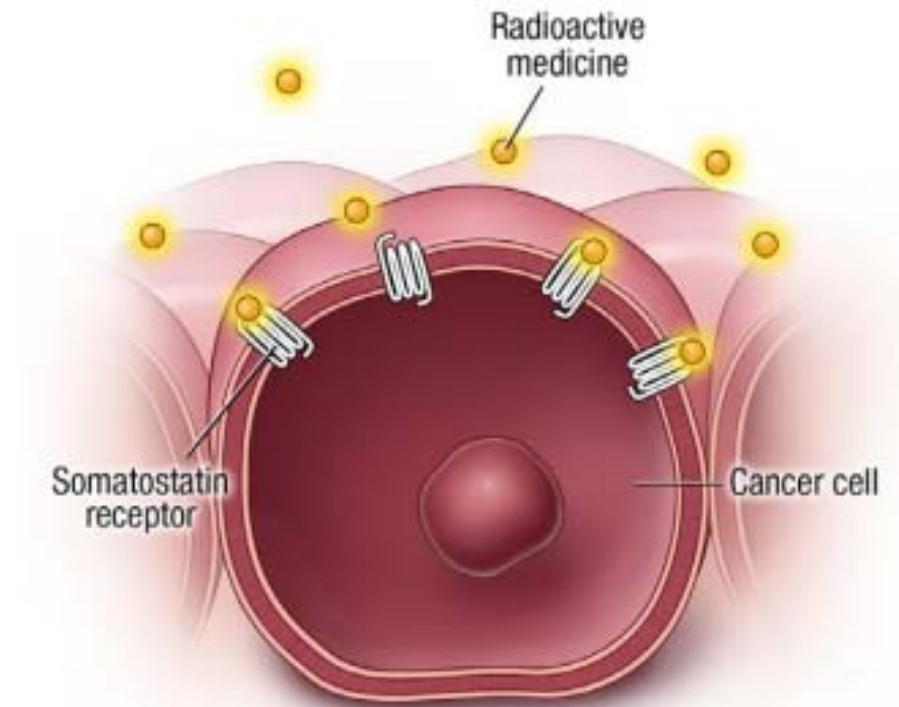


Image Courtesy of Mayo Clinic: Peptide Receptor Radionuclide Therapy (PRRT) for Somatostatin-Positive Tumors

Licensing and Use

- Licensing
- Contaminants
- Authorized Users and Administration
- Written Directives

Emerging Risks and Control Strategies: Radiopharmaceutical Therapy – Lutetium 177

Type of License	Radioactive Material	Chemical and/or Physical Form	Maximum Amount That Licensee May Possess At Any One Time
Broad Scope	Any radioactive material with atomic numbers 3-83, inclusive	Any	1 curie per radionuclide. Total possession not to exceed 10 curies
Specific - Medical	Any radioactive material authorized by 35.300	Any	Total of all isotopes not to exceed 4 curies

Contaminants



Authorized Users and Administration

- Authorized Users
 - Training and Experience
 - Board Certification
 - Previously Approved on a License
- Administering
 - NRC: No requirements
 - Minnesota: CNMT

Written Directives

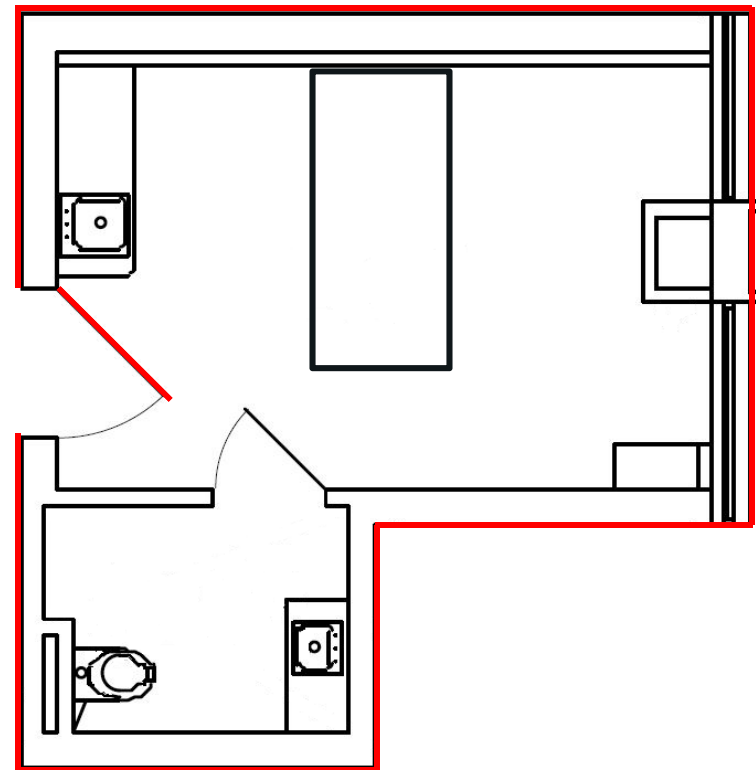
- Requirements
 - Patient's name
 - Radioactive drug
 - Dosage
 - Route of administration
- Best Practices
 - Pregnancy test
 - Release/discharge criteria

Outpatient or Inpatient

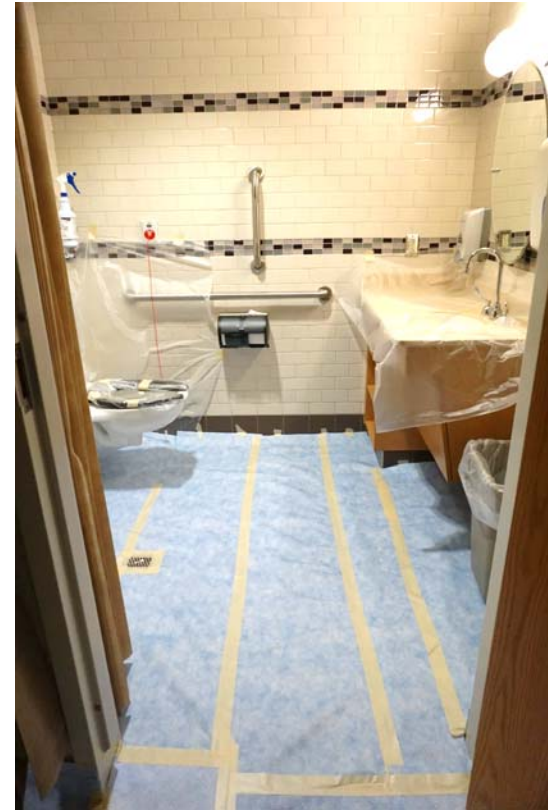
- Releasable based on:
 - Activity administered
 - Dose rate measurement
 - Patient specific calculation

Therapy Location

— Lead shielding

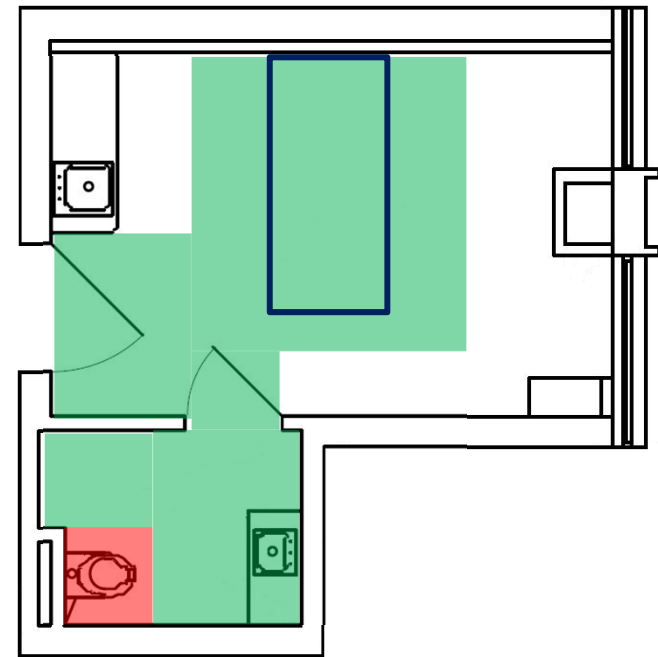
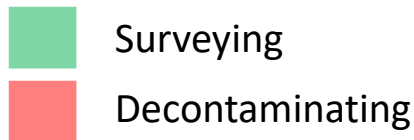


Room Preparation

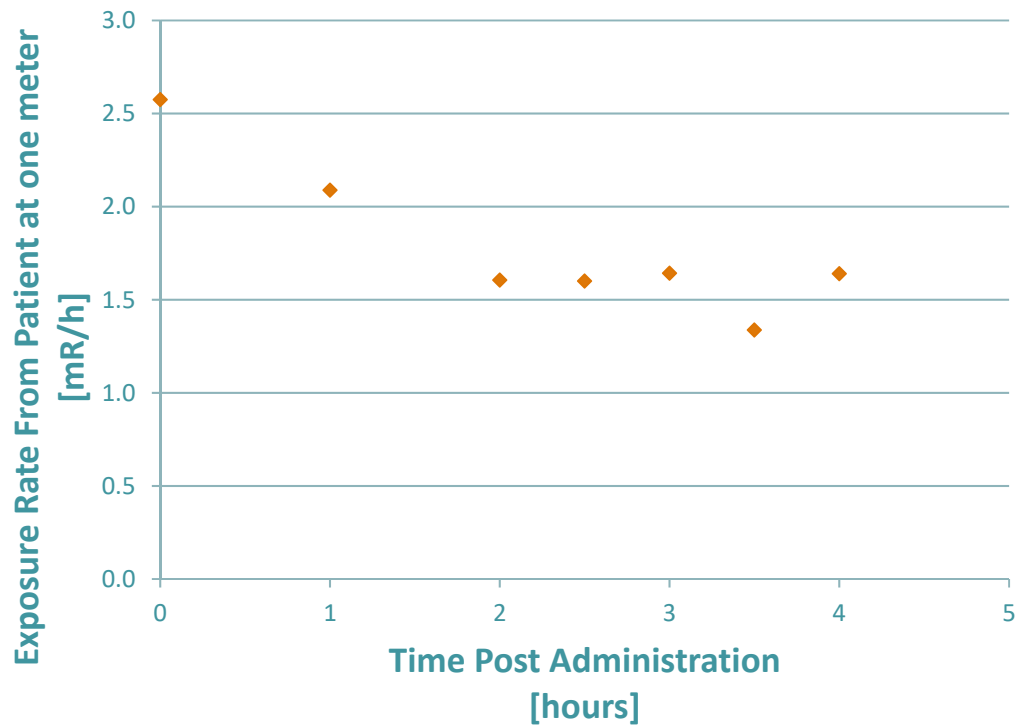


Room Decontamination

- Who is decontaminating?
- Action levels
- Waste disposal
- Decontamination supplies



Exposure Rate From Lu-177 Patients



Lessons Learned from Lu-177

- Nurse training and dosimetry
- Space
- Contaminated items
- Backup rooms
- Unexpected contamination

Questions?