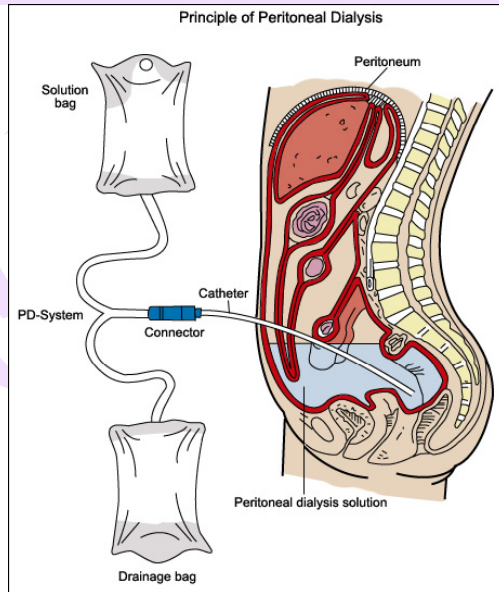


# Decreasing the Incidence of Peritonitis



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*ASN 2010*  
*30 minute talk*

## Impact of peritonitis

**Peritonitis causes**  
***hospitalization,***  
***pain,***  
***peritoneal membrane damage,***  
***catheter loss,***  
***technique failure***  
***and sometimes death.***



## Outline of talk/learning objectives

- Approaches to prevent peritonitis
  - Emphasis on training and preventing peritonitis from contamination
- Calculating peritonitis rates and monitoring outcomes

## Think about what causes peritonitis

- **Contamination**
- Exit site and tunnel infection
- Involvement of the slime layer of the internal catheter (relapsing/recurrent)
- GI sources
- Bacteremia (rare)
- GU sources (rare)

## Influence of PD training nurses' experience on peritonitis rates

- Retrospective observational single center
- Disconnect systems used; CAPD mostly
- One nurse trained two patients at one time
- Nurse orientation was 6 weeks
- Patient training averaged 5 hours per day, # days dependent on patient

Chow et al Clin J Am Soc Nephrol 2007: 2: 647-652

## RESULTS:

The nurses with the most experience trained the patients who had the shortest time to 1<sup>st</sup> Gram positive peritonitis!!

Exactly the opposite of what I would expect.



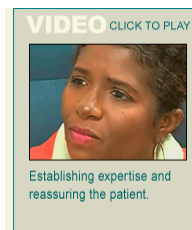
Chow et al Clin J Am Soc Nephrol 2007: 2: 647-652

## Explanation by the authors:

Program had recently implemented newer teaching and training techniques using **adult learning theory**. They felt the more established nurses did not embrace this approach as readily.



ISPD web site has a section on Training the Trainer



Chow et al Clin J Am Soc Nephrol 2007: 2: 647-652

## Principles of Adult Learning

- *Motivation* : preparation for the lesson
- *Reinforcement*: practice under observation
- *Retention*: retraining important
- *Transference*: ability to use information taught in new setting—example, response to contamination

<http://honolulu.hawaii.edu/intranet/committees/FacDevCom/guidebk/teachtip/adults-2.htm>

## Multi-center Gambro Trial of PD education

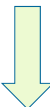
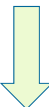
Developed a curriculum 'PD Directions' based on **adult learning theory**

- Focus on what the learner needs to learn rather than on what the teacher needs to teach.
- Uses learning objectives

*Time of training dependent in part on learner variables*

Hall G et al Nephrology Nursing J 2004: 31: 149-163

## Peritonitis rates in episodes per year

	<i>Adult learners method</i>	<i>Control method</i>
pre training	0.60	0.36
		
post training	0.34	0.46

Hall G et al Nephrology Nursing J 2004: 31: 149-163

## Methods used to teach PD

- Demonstration, while teaching theory
- Patient practiced using a doll or PD apron



- Thorough hand washing emphasized
- Test given at the end of training to ensure learning objectives met



Chow et al Clin J Am Soc Nephrol 2007; 2: 647-652  
Chen et al PDI 2008; 28 (suppl 3): S72-S75

## Independent predictors of peritonitis

<u>Risk factor</u>	<u>HR</u>	<u>p value</u>
Late arrival for training	1.56	0.04
Baseline albumin	2.0	0.003
Not significant: DM, age, Charlson comorbidity index		

*I think the relationship between arriving late for training and subsequent peritonitis risk has to do with motivation*

Chow et al NDT 2007; 22: 545-551

## Chow paper gives an excellent description of what the PD curriculum needs to include:

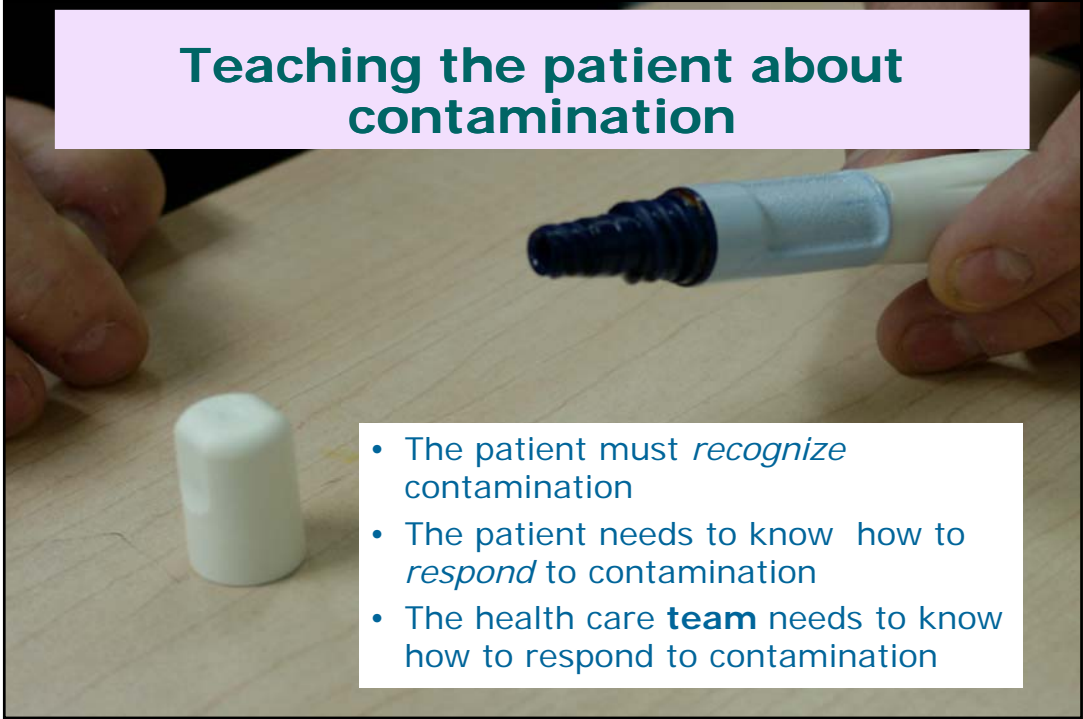
- Patient able to perform procedure safely
- Recognizes peritonitis



- Able to trouble shoot with appropriate responses

Chow et al Clin J Am Soc Nephrol 2007: 2: 647-652

## Teaching the patient about contamination

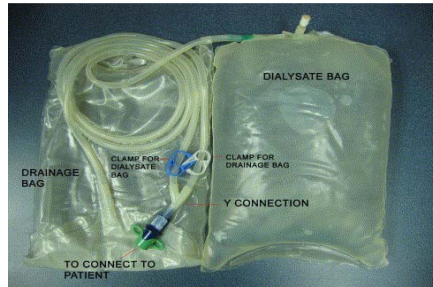
- 
- A hand holding a blue marker, with a white cap nearby, illustrating the concept of contamination.
- The patient must *recognize* contamination
  - The patient needs to know how to *respond* to contamination
  - The health care **team** needs to know how to respond to contamination

# RCT of two connection systems for CAPD



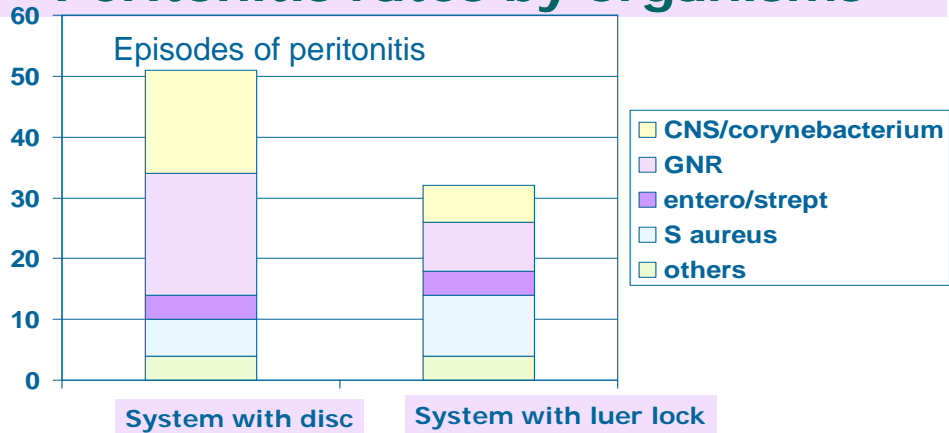
System one with disc

System two with luer lock



Wong et al AJKD 2006; 48: 464-472

## Peritonitis rates by organisms



122 dialysis years  
0.52 episodes/year

125 dialysis years  
0.34 episodes/ year



**There was a relationship between product defect and peritonitis for the system with the disc connection.**

**Leakage of bags was the most common defect.**



**Ratio of peritonitis incidence for the disc connection system versus the luer lock system by center**

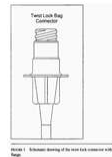
<u>Center</u>	<u>Ratio of peritonitis rate</u>
1	2.09
2	4.41
3	2.25
4	0.63
5	1.26
6	1.94

**NOTE TREMENDOUS VARIATION FROM ONE UNIT TO ANOTHER**

## Protocol for contamination

- Patient recognizes contamination (leaking bag, dropping end of catheter in lap, cat gnawing on tubing, etc)

Dropping the end of the catheter without the cap can cause many types of peritonitis

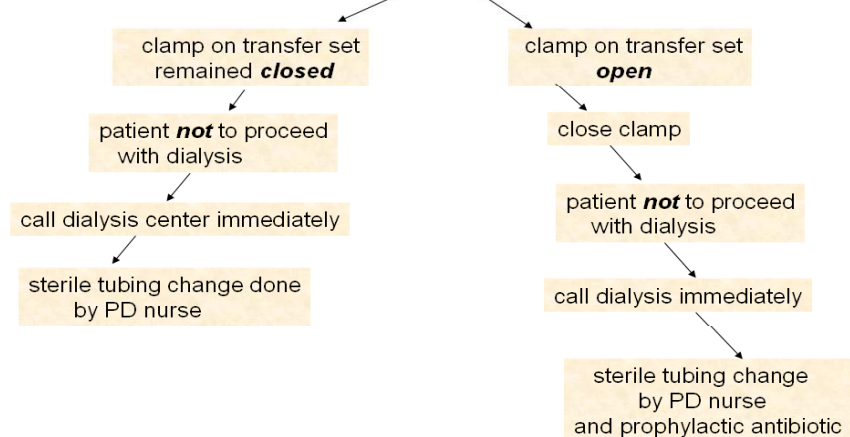


Cats can cause *Pasturella peritonitis*

- Patient calls the unit

Unit takes appropriate approach (tubing change and/or prophylactic antibiotics)

### Algorithm for PD Contamination



## Retraining and home visits may be important to lower peritonitis risk

- Overall peritonitis rate: 1 episode/29 mo
- A lower peritonitis rate was associated with centers that had:
  - **Pre-dialysis education**
  - **Home visits**
  - **Re-training**

Observational study in 120 Italian PD centers  
Bordin G et al. J Ren Care 2007 33 (4): 165-171

## Why is re-training needed?

Another multi centered Italian study

- 353 patients answered a questionnaire
- 191 patients had home visits with a score card

23% were *non-compliant with exchange procedure.*

*This was associated with higher peritonitis rates.*

Russo et al KI suppl 2006: 103: S 127-32

## Summary of PD training to prevent peritonitis

- The PD nurse **trainer must be trained**
- **Adult learning theory** as applied to PD is a sound educational approach
- Teaching problem solving to include **contamination** and response is critical
- **Re-training** may very well prevent peritonitis

Look at the ISPD guidelines: Bernardini et al PDI 26: 625-632, 2006

## Monitoring peritonitis in PD program

- Peritonitis *rates*
- and organism *rates* (which gives indication of cause)
- Examination of potential causes



## Peritonitis rate:

**# peritonitis episodes ÷ time at risk in group**

Example: 7 episodes in 6 patients in a program with 70 patients over the year with 44 years at risk (528 months)

RATE:

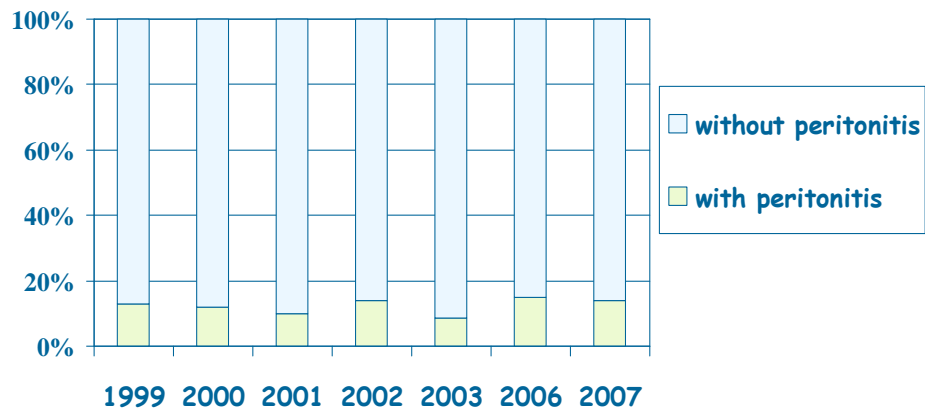
7 episodes ÷ 528 months = One episode per 75 mo

Or

7 episodes ÷ 44 years = 0.16 episodes per year

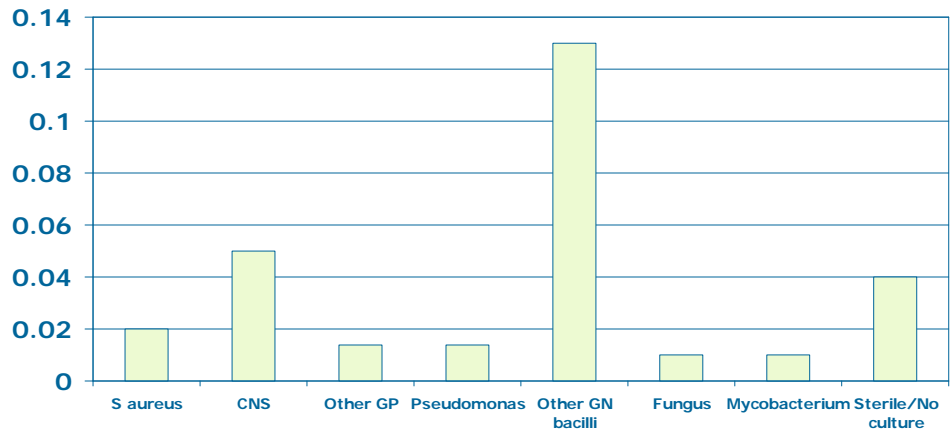
*PD Registry Data--DCI Oakland*

Look at the % of patients in the program with peritonitis for each year



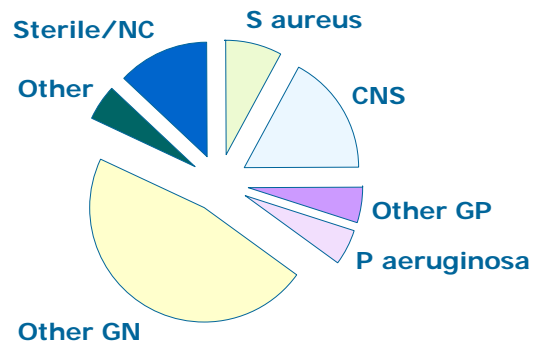
Data from DCI of Oakland PD Registry

## Examine peritonitis by organism



Data from Univ of Pittsburgh Registry 2004-2008: Total rate is 0.28 episodes per year 214 dialysis years at risk Adapted from Piraino PDI 2010; 30: p 278

## As compared to examining organisms by percentage



## SUMMARY

- Preventing peritonitis is key to a successful PD program.
- Protocols to prevent peritonitis include having trained nurses to do the training and re-training
- Monitor infection rates and have in place a multi-disciplinary team which includes the PD nurse

## Resource for preventing peritonitis

### 2005 ISPD PD Related Infections Recommendations

Piraino B, et al PDI 2005; 25: 107-131