4 Lavandier M, Carré Ph, Kouyoumdjian L, Janvoie B, Diot P, Diot E. Utilisation des corticoides inhalés dans le traitement des pneumopathies interstitielles. Méd Hyg 1991; 49:26-9
5 Imbeault B, Cormier Y. Usefulness of inhaled high-dose corticosteroids in allergic bronchopulmonary aspergillosis. Chest 1993; 103:1614-17

Chlamydia Pneumoniae

To the Editor:

As part of a study of serologic cross-reactivity between *Chlamydia pneumoniae* and *Chlamydia trachomatis*, Kern et al[1] recently reported a *C pneumoniae* seroprevalence rate of 86 percent (73 percent pre-existing and 13 percent acute antibody) in 147 active male firefighters and police officers in Providence, R.I. The authors state that this seroprevalence rate of 86 percent is the highest yet reported and that the reason for the high seroprevalence rate in Rhode Island is unknown, although they speculate that Rhode Island might have experienced a *C pneumoniae* epidemic in the years just prior to their study. Making the assumption that seroprevalence rates found for firefighters and policemen are generalizable to other populations, they question causal associations reported in many previous studies between serologic criteria for *C pneumoniae* infection and community-acquired pneumonia. I wish to comment on the validity of their extrapolation of results to other apparently well populations.

Transmission of *C pneumoniae* infections has been reported within families and close-knit communities.[2,3] Consistently higher antibody prevalence in men as compared with women has suggested that transmission occurs predominantly at the workplace.[4] *C pneumoniae* IgG titers of 1:32 or greater were found in 83 percent of 72 asymptomatic healthcare workers, 17 percent of whom had serologic evidence for "acute" infection.[5] In 1992, I obtained *C pneumoniae* serologic studies on 11 asymptomatic adult healthcare workers at a single primary care office; all were seropositive (polyvalent antibody MIF titer$\geq$1:16) compared with a seropositivity rate of 62 percent in 435 outpatients with acute respiratory illnesses recruited from within the same community (difference is significant at $p<0.01$ by Fisher's Exact Test). These findings suggest that (1) the high antibody prevalence noted by Kern et al[1] for male firefighters and police officers may be related to enhanced asymptomatic transmission of *C pneumoniae* within close-knit workplace environments, and (2) the high seroprevalence rate noted for the highly selected group of subjects studied by Kern et al[1] is unlikely to reflect the *C pneumoniae* seroprevalence rate of the community of Providence or the state of Rhode Island.

Random population sampling, or some other population-based method, will be necessary to determine accurately *C pneumoniae* seroprevalence rates within geographic areas. Such studies may be particularly important in studying associations of *C pneumoniae* infection and geographic variations in ischemic heart disease.[6,7] Population estimates of *C pneumoniae* seroprevalence extrapolated from unrepresentative groups, as well as arguments and conclusions based on such extrapolations, are likely to be biased.

David L. Hahn, M.D.,
Madison, Wisconsin

Reprint requests: Dr. Hahn, Arland Park Clinic, 3434 E. Washington Ave., Madison, WI 53704

References

1 Kern DG, Neill MA, Schacter J. A seroepidemiologic study of *Chlamydia pneumoniae* in Rhode Island: evidence of serologic cross-reactivity. Chest 1993; 104:208-13
2 Ghosh K, Frew CE, Carrington D. A family outbreak of *Chlamydia pneumoniae* infection. J Infect 1992; 25(suppl)1:99-103
3 Mordhorst CH, Wang SP, Grayston JT. Outbreak of *Chlamydia pneumoniae* infection in four farm families. Eur J Clin Microbiol Infect Dis 1992; 11:617-20
4 Grayston JT, Campbell LA, Kuo C-C, Mordhorst CH, Saikku P, Thom DH, et al. A new respiratory tract pathogen: *Chlamydia pneumoniae* strain TWAR. J Infect Dis 1990; 161:618-25
5 Hammerschlag MR. *Chlamydia pneumoniae* infections. Pediatr Infect Dis J 1993; 12:260-61
6 Garg R, Madans JH, Kleinman JC. Regional variation in ischemic heart disease. J Clin Epidemiol 1992; 45:149-56
7 Hahn DL. Regional variation in ischemic heart disease: a possible missing risk factor? J Clin Epidemiol 1993; 46:668-69

To the Editor:

We appreciate Dr. Hahn's interest in our article (*Chest* 1993; 104:208-13) and agree that our observation of a high *Chlamydia pneumoniae* seroprevalence rate in a municipality's public safety workers does not guarantee an equally high rate in the general population. We had hypothesized previously that person-to-person transmission of infectious agents might be enhanced in firefighters as a result of their military barracks-like working conditions (1) and anticipated that firefighters would have a higher seroprevalence to *C pneumoniae* than other public safety workers, such as police. Unexpectedly, we found that police officers who do not work together in such close proximity, had a *C pneumoniae* seroprevalence rate virtually identical to that of firefighters (84 percent vs 85 percent, police vs firefighters, respectively, for IgG$\geq$1:16). While this data did not support our original study hypothesis, it did suggest that Rhode Island could have a high background seroprevalence to *C pneumoniae*. Community wide epidemics of *C pneumoniae* infection have been described and as we noted in the Discussion section could be a plausible explanation for the high seroprevalence in our study. We could neither prove nor disprove this hypothesis because no prior serosurveys for *C pneumoniae* had been done in our area, and sera collected from other groups at the same time as our study was not available for determination of *C pneumoniae* antibody levels.

The actual seroprevalence rate in Rhode Island is immaterial to our contention that the microimmunofluorescence (MIF) test has unacceptably low specificity in the diagnosis of *C pneumoniae* infection. More to the point, we observed a high correlation between *C pneumoniae* and *Chlamydia trachomatis* antibody titers, as well as a 13 percent seroprevalence for recent *C pneumoniae* infection in the absence of clinical findings. The latter was difficult to reconcile with the prevailing serologically based belief that *C pneumoniae* accounts for 6 to 10 percent of community-acquired pneumonia.[2] We remain concerned that the low specificity of the MIF test will continue to spawn disease associations that may represent nothing more than epiphenomena. Recently, Hammerschlag has raised similar concerns.[3]

Characterization of the antibody response to *C pneumoniae* has been made difficult by apparent cross-reactivity with other *Chlamydia* species, patient age as a determinant of antibody response and the chronologic relationship of the serum antibody level to clinical illness. A lack of seroconversion in culture positive individuals has even been noted. These factors have made it problematic to gain an accurate perspective on the role of *C pneumoniae* in various disease processes using currently available serologic assays. The further development of our understanding of the pathobiology of *C pneumoniae* will necessitate the use of a combination of molecular detection techniques and new serologic assays in the conduct of future clinicoepidemiologic studies of *C pneumoniae*.

David G. Kern, M.D., and
Marguerite A. Neill, M.D.,
Brown University School of Medicine,
Pawtucket, Rhode Island

REFERENCES

1 Kern DG, Neill MA, Wrenn DS, Varone JC. Investigation of a unique time-space cluster of sarcoidosis in firefighters. Am Rev Respir Dis 1993; 148:974-80
2 Grayston JT, Campbell LA, Kuo CC, Mordhorst CH, Saikku P, Thom DH, et al. A new respiratory tract pathogen: *Chlamydia pneumoniae* strain TWAR. J Infect Dis 1990; 161:618-25
3 Hammerschlag MR. *Chlamydia pneumoniae* infections [letter] Pediatr Infect Dis J 1993; 12:260-61

Continuous Infusion Oral Lorazepam for Patients in the ICU

To the Editor:

An important aspect of caring for the critically ill patient is the provision of adequate sedation, limiting myocardial oxygen demand, work of breathing, and anxiety.[1] Several drugs have been used in the ICU to provide sedation. Factors such as onset of action, amnestic properties, duration of action, lipid solubility, metabolic pathways, and hemodynamic effects of the drug determine its usefulness in the ICU.

Single-dose studies and studies in non-ICU patients suggest that lorazepam has several advantages over other agents.[2-4] The primary advantage is lack of active metabolites and, therefore, a relatively predictable duration of action. Continuous infusion administration methods decrease demands on nursing time, provide sustained anxiety relief, and decrease hemodynamic effects. Additionally, it is imperative to provide constant anxiety control if a patient is being treated with neuromuscular blocking agents.

Unfortunately, provision of continuous sedation with intravenous (IV) lorazepam is a costly venture. Costs for continuous infusion lorazepam are several thousand dollars per month in our 13 bed general medical ICU. In addition, as a result of the instability of the agent, continuous infusion lorazepam usually monopolizes an IV access site.

As a result of these problems, we designed a method of administering oral lorazepam solution through a nasogastric tube.[5,6] Lorazepam Intensol is a 90 percent bioavailable, 2 mg/ml dye-, alcohol-, and sugar-free solution.[7] A 60-ml syringe (Becton-Dickinson, Rutherford, New Jersey) was filled with 10 to 40 ml oral Lorazepam Intensol solution (Roxane Laboratories, Columbus, Ohio) and was attached to Bard Tamper Resistent Patient Controlled Analgesia (PCA) tubing (CR Bard, North Reading, Mass). The syringe was placed into a Bard PCA pump (CR Bard, North Reading) and the patient's lorazepam basal infusion rate set. The PCA tubing was attached to one part of an enteral Y-extension set (Corpak, Wheeling, Ill). This, in turn, was attached to a Salem Sump Tube (Sherwood Medical, St. Louis, Mo). The other two sites were used for nasogastric feedings and intermittent medical administration. Attached to the syringe and tubing were color coded labels with the warning, "For oral administration, only." Food coloring was added to the oral lorazepam solution to discourage inadvertent IV administration.

Currently, oral lorazepam has been administered to four stable patients in our ICU. We have only tried oral lorazepam solution in hemodynamically stable patients tolerating enteral feedings and medications. A one-to-one conversion from IV to oral lorazepam solution was made, resulting in adequate sedation. This method of delivery should reduce the number of IV sites needed, potential for IV related infection, and cost (oral lorazepam $0.46 per mg, IV $3.20 per mg).

Sharon Watling, Pharm.D.,
John Yanos, M.D.,
Elizabeth Lonberger, R.N., and
Susan Lee, B. Pharm.,
University of Missouri,
Departments of Medicine, Nursing, and Pharmacy,
Columbia, Missouri

REFERENCES

1 Miller-Jones C, Williams JH. Sedation for ventilation. Anesthesia 1980; 35:1104-07
2 Greenblatt DJ, Ehrenberg BL, Gunderman J, Scavone JM, Tai NT, Harmatz JS, et al. Kinetic and dynamic study of intravenous lorazepam: comparison with intravenous diazepam. J Pharmacol Exp Ther 1989; 250:134-39
3 Camu F. Clinical use of lorazepam in postoperative intensive care. Acta Anaesthesiol Belg 1978; 2:191-200
4 Simpson PJ, Eltringham RJ. Lorazepam in intensive care. Clin Ther 1981; 4:150-62
5 Ingebretson MC, Pucino F, Beck C, Strommen G, McAskill AC, Rao UP, et al. Continuous nasogastric morphine infusion. Drug Intell Clin Pharm 1987; 21:796-97
6 Watling S, O'Donnell J, Ergen H. Continuously infused morphine [letter]. Focus Crit Care 1988; 15:258
7 Package Insert. Lorazepam Intensol. Roxane Laboratories: Columbus, Ohio, 1991

Critical Illness in Pregnancy

To the Editor:

I read with interest the article entitled "Critical Illness in Pregnancy" by Nancy A. Collop and Steven A. Sahn, which was published in the May, 1993, issue of *Chest*.[1] I agree with them that the pregnant patient with medical complications represents a unique challenge to the intensive care specialist. In their review of patients who were pregnant and admitted to the medical ICU (MICU), in almost 3 years of time, there were only 20 obstetric patients. Our facility is smaller, but our per capita admission rate to the MICU for obstetric patients is about equal. At a previous facility, Truman Medical Center, East, I was the intensivist. Our numbers were strikingly similar when adjusted for deliveries. My impression on reading the article was the strikingly high rate of pulmonary artery and arterial catheters placed when compared with their general MICU patients. I was struck by this fact, and then I wondered whether this was possibly a result of the fact that in most cases, a pulmonary artery (Swan-Ganz) catheter is not placed by an obstetrician or a maternal/fetal medicine expert but, more than likely, by an intensivist, pulmonologist, or cardiologist. It could be a confluence of two uncomfortable situations for the practicing physicians. One would be a critically ill obstetric patient, which, by and large, does not occur with frequency in the obstetric population, therefore, not frequently presenting to the obstetrician. The second would be a critically ill patient who happened to be pregnant, presenting to the intensivist who infrequently sees pregnant patients. Could it be that the higher rate of Swan-Ganz catheterization in Collop and Sahn's[1] population was a result of this confluence of uncomfortable situations of these practicing physicians?

It is of interest that a recent article in The *Journal of the American Medical Association* by Naylor et al[2] called for an integrated strategy for guideline development and research promotion on the pulmonary artery catheterization. No mention is