

## Diphtheria Antitoxin Distribution

By: Dr. Ronald Eckoff

“The health of our township is good, with no epidemics to report. Most of the deaths have been of children, from diphtheria, four in all.” James Grohorn, clerk, Windsor Township, Fayette County, November 12, 1880

In 1894 the University of Iowa sent Dr. Walter Bierring, the first Chair of the Department of Pathology and Bacteriology to the Pasteur Institute in Paris for a summer course. While there he watch Emil Roux make diphtheria antitoxin by injecting toxin into horses. He came back and produced 300 doses, which was the first diphtheria antitoxin produced west of New York City

According to *Bacterial & Mycotic Infections of Man*, 4<sup>th</sup> Edition, 1965, diphtheria was once the leading cause of death among children. Some additional background about diphtheria from the same book includes: Diphtheria is the classic example of a bacterial disease in which the causative organism is capable of only limited invasion of superficial tissue and in which almost all of the severe damage to cells may be attributed to a soluble toxin, released by the bacteria and carried to remote organs by the bloodstream. The local lesion is most commonly in the throat or nasopharynx. Prompt administration of antitoxin is very important in neutralizing the toxin. In a 1943 report on the epidemiology of diphtheria during the previous 40 years, W. T. Russell summarized:

Antitoxin given on 1 <sup>st</sup> day of disease	0 case fatality rate
Antitoxin given on the 2 <sup>nd</sup> day of disease	4.2% case fatality rate
Antitoxin given on the 3 <sup>rd</sup> day of disease	11.1% case fatality rate
Antitoxin given on the 4 <sup>th</sup> day of disease	17.3% case fatality rate
Antitoxin given on the 5 <sup>th</sup> or greater day	18.7% case fatality rate

During the July 1, 1908 – June 30, 1910 biennial period, the State Board of Health added a new department for the purpose of distributing diphtheria antitoxin to the people of the state. To do this the board contracted with the H. M. Alexander Laboratories, which agreed to furnish diphtheria antitoxin for 50 cents for the 1,000 unit syringe package and \$2.00 for the 5,000 unit syringe package. The board established distribution stations in all 99 counties where the antitoxin could be purchased from selected druggists. The druggist could order directly from the laboratory and could return antitoxin that was about to expire. The druggist did not have to advance anything for the antitoxin, but remitted funds to the laboratory once a month.

The State Board of Health maintained a supply of antitoxin that was shipped to druggists in an emergency. The druggist was allowed to charge 10 cents for handling the 1,000 unit package and 25 cents for handling the 5,000 unit package. There were initially 141 stations in 136 towns.

The Seventeenth Biennial Report for the period ending June 30, 1914 indicated the number of distribution stations had increased to 250. The following statistics are for the preceding four years:

Packages to stations from the manufacturer	4,843
Packages to stations from the State Board supply	3,415
Cost at regular prices	\$ 38,422.50
Amount actually paid	\$ 11,526.75
Amount saved for the people of Iowa	\$ 26,895.75

This may sound like a small amount in 2015 terms. However, it is quite impressive when you realize the total annual state appropriation for the State Board of Health, including the Bacteriological Laboratory (now the University Hygienic Laboratory) was \$19,800. And the Department received no federal funds.

During the 1914-1916 Biennium, 14, 732 packages were used. The market price was \$76,534 and the consumers paid only \$23,356. This was a savings of \$53,178. By January 1917, the number of stations had been increased to 300 and new contracts had been signed for reduced coasts. Also, tetanus antitoxin, typhoid vaccine, and smallpox vaccine had been added to the contract.

In 1918 the contract was with E. R. Squibb & Sons and a few examples were:

	regular price	state price	savings
Diphtheria antitoxin 10,000 units	\$12.00	\$3.35	\$8.65
Tetanus antitoxin 5,000 units	\$ 6.00	\$4.00	\$2.00
Typhoid vaccine 1 treatment	\$ .75	\$ .28	\$ .47
Smallpox vaccine 5 vaccinations	\$ 1.00	\$ .40	\$ .60

Reports of the program also commented: “The benefits to the state in the way of lessening the severity of diphtheria cannot be measured. No estimate of the number of lives saved by having a supply of antitoxin in practically every neighborhood in the state can be made. When the old commercial prices prevailed, many druggists refused to handle antitoxin.”

A vaccine for diphtheria immunization was developed and a statewide diphtheria immunization program started in the fall of 1925. The slogan was “No diphtheria in Iowa by 1930.” That goal was not achieved, but there was a steady decline in diphtheria and Iowa has not had a case reported since 1967.