APPLE TREE DENTAL
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**An Advanced Dental Therapist in Long-Term Care: Heather Luebben's Case Study**

## Overview

The number of senior citizens (ages 65 and older) is expected to double to more than 98 million by 2060, when they will represent nearly one-quarter of the U.S population.[1] A convergence of trends raises questions about whether the dental care delivery system, as currently structured, can meet their needs. Not only is the senior population growing – they are living longer. By 2030, according to the Census Bureau, the U.S. will be home to about nine million people age 85 and older[2]; many will face mobility challenges.[2] And, compared to earlier decades, more seniors are expected to have their teeth, which means they will need continuing care. With more natural teeth there is more potential for decay. It is also notable that many seniors take multiple prescription drugs daily, which commonly cause dry mouth increasing the risk for caries and other oral complications. About 40 percent of senior citizens (age 65 and above) report taking at least five medications daily.[3] Taken together, in the coming years the U.S. will have a much larger elderly population that is expected to have greater oral health needs as well as significant mobility challenges[4].

*Can dental therapists help the current, primarily office-based, dental delivery system meet the needs of long-term care residents?*

Dental therapists are midlevel providers trained to deliver preventive and routine restorative care, such as placing fillings. Compared to dentists, dental therapists require less training focused on fewer specific procedures and have lower salaries than dentists. Research has confirmed that they provide high-quality, cost-effective routine care and improve access to treatment in areas where dentists are scarce[5]. Dental therapists have been practicing in Minnesota since 2011. In 2017, Apple Tree Dental employed seven full-time dental therapists, including Heather Luebben, the subject of this case study.

Heather Luebben, RDH, ADT

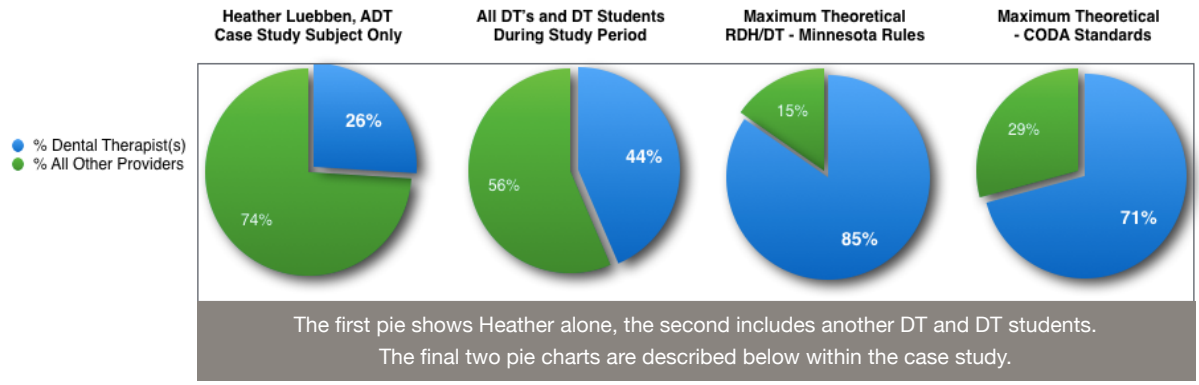
In 2012, Apple Tree Dental began deploying Heather Luebben as part of a care team providing on-site services to residents of the Minnesota Veterans Home. This report provides an analysis of the productivity and cost effectiveness of an advanced dental therapist (ADT) with the purpose of assessing the appropriateness and potential benefit of using dental therapists to serve institutionalized elderly. While the results

of this study are specific to the unique circumstances under which care was provided at the Minnesota Veterans Home (e.g., team provider mix, patient needs, payment mechanism), our findings suggest that other dental programs providing care to this vulnerable population can use this model successfully.

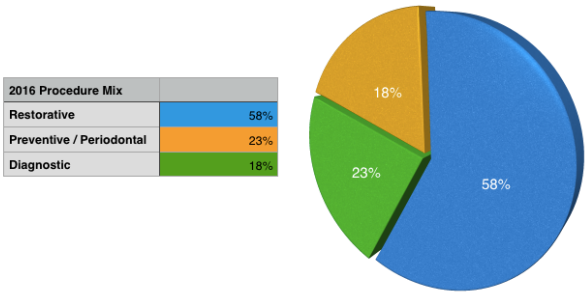
## Highlights of Case Study Findings

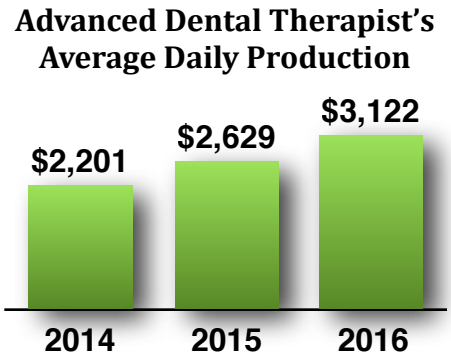
- 82-87% of gross production of on-site procedures provided during the case study were within the scope of an Advanced Dental Therapist in Minnesota.
- 71-79% of gross production of on-site procedures provided during the case study were within the scope of a CODA-trained dental therapist.

### Contribution to Total Gross Production Minnesota Veteran's Home 2014 - 2016



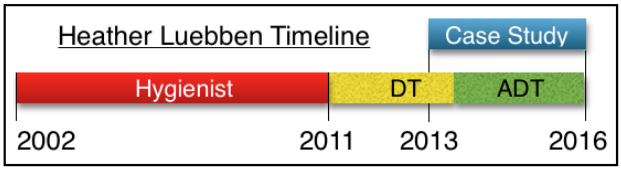

### Dental Services by Category 2016




- In 2016, the daily gross production of the dentist exceeded that of the Advanced Dental Therapist by $500-$600.
- Due to a difference in salaries, the estimated annual cost reduction for Apple Tree of deploying an ADT to the Veterans Home (234 days of care) would be $52,000.

## Case Study Background




Heather Luebben began working at Apple Tree in 2008 as a dental hygienist and she gained experience working in clinics, long-term care facilities, and other settings, including the Minnesota Veterans Home. Seeking to advance her career, in 2011 she graduated from Metropolitan State University's first class of advanced dental therapists. From 2012 through 2016, Heather worked at the Minnesota Veterans Home one day a week, as part of an on-site care team lead by Dr. Jayne Cernohous, DDS, who collaborated with Heather throughout her career at Apple Tree.

The Minnesota Veterans Home, located in Minneapolis ("Veterans Home"), is one of four State operated veterans homes in the state. It offers a combination of skilled nursing care with special care units focused on dementia, Alzheimer's, domiciliary care, rehabilitation services, recreational therapy, and work therapy. The Veterans Home serves 300 residents, all of whom are indigent. The State funds their medical and housing needs. It is owned, operated and managed by the State, with routine certification annually by the federal Veterans Administration.

## Apple Tree Dental 's Contract

Apple Tree Dental's contract with the Veterans Home included an *annual spending cap*; any services provided exceeding the cap were not reimbursed. Furthermore, the Veterans Home limits the types and frequencies of dental services (e.g., denture repair but not fabrication and the number of dental cleanings per year).

Apple Tree's fee schedule is based on usual and customary fees charged in the Minneapolis and St. Paul (Twin Cities) area. These fees are referred to as "Gross Production" in this report. Via the contract, Apple Tree accepted lower payments from the Veterans Home.

## Staffing the on-site team

The Veterans Home on-site dental team includes a supervising dentist, two dental therapists (including Heather Luebben), a dental hygienist, and two dental therapy students. The entire treatment team is not typically on-site at any one time. For example, the dentist and ADTs are usually not deployed together. The ADT typically works with dental assistants and a care coordinator. The supervising dentist typically works with


On-Site Care

a hygienist or ADT students, dental assistants and a care coordinator. The care coordinator schedules appointments with the appropriate dental team members according to patients' needs. Heather Luebben usually worked at the Veterans Home one day per week.

## Heather's Supervision at the Veterans Home


Jayne Cernohous, DDS

Heather provided care at the Veterans Home under the general supervision of Dr. Jayne Cernohous. The range of procedures she can perform without first consulting Dr. Cernohous are spelled out in her collaborative management agreement as required by the Minnesota Board of Dentistry. Interactions between Heather and Dr. Cernohous occurred primarily through Apple Tree's cloud-based Electronic Health Record (EHR), which supports tele-dentistry interactions, including asynchronous, often called "store and forward," collaborations. When Heather encountered clinical situations requiring consultation with Dr. Cernohous, such as a medication change, she gathered and entered diagnostic information in the EHR. In their experience, rarely did the need for a consultation require either stopping or rescheduling dental therapy services that were underway.

## Measuring Productivity

Because Heather is a dual licensed practitioner, her production includes both dental hygiene and dental therapy scopes of practice. Services include periodic and limited oral evaluations, radiographs, preventive and periodontal services, and restorative care. Heather's total gross production also includes a "House Call" or facility visit fee billed to each patient she treats at the Veterans Home, to help cover the costs of transporting the care team and equipment. The House Call charges are far less than the costs of transporting Veterans to traditional dental offices, which include nursing staff time, use of special transportation services, and travel costs for an accompanying responsible party. In total, these costs can be more than double that of the needed dental services.

## Heather's average daily production

Average daily production revenues were tabulated for all on-site team members, which included a supervising dentist, two ADTs, two dental therapy students, a dental hygienist, dental assistants and a care coordinator (see Table 1).

Heather's average daily gross production increased steadily during the Case Study, from $2,201 in 2014 to $3,122 in 2016.

**Table 1. Days, Gross Production, Gross Production per Day, Visits and Visits per Day by Provider per Annum, Veterans Home 2014-2016**

| Year | Provider | Days | Gross | Gross/Day | Visits | Visits/ Day | Patients |
|---|---|---|---|---|---|---|---|
| **2014** | Cernohous (DDS) | 35 | $107,954 | $3,084 | 541 | 15 | 236 |
| **2015** | Cernohous (DDS) | 43 | $132,142 | $3,073 | 576 | 13 | 246 |
| **2016** | Cernohous (DDS) | 28 | $81,927 | $2,926 | 341 | 12 | 188 |
| **2014** | Heather (ADT/RDH) | 26 | $57,222 | $2,201 | 215 | 8 | 133 |
| **2015** | Heather (ADT/RDH) | 12 | $31,546 | $2,629 | 91 | 8 | 70 |
| **2016** | Heather (ADT/RDH) | 21 | $65,565 | $3,122 | 213 | 10 | 136 |
| **2014** | Other DT, RDH | 30 | $23,345 | $778 | 187 | 6 | 147 |
| **2015** | Other DT, RDH | 31 | $35,072 | $1,131 | 194 | 6 | 153 |
| **2016** | Other DT, RDH | 26 | $26,148 | $1,006 | 134 | 5 | 121 |
| **2014** | No DT Students | n/a | n/a | n/a | n/a | n/a | n/a |
| **2015** | DT Students | 6 | $8,083 | $1,347 | 19 | 3 | 17 |
| **2016** | DT Students | 16 | $23,019 | $1,439 | 47 | 3 | 37 |
| **2016** | Other RDH | 4 | $2,769 | $692 | 26 | 7 | 26 |

## Heather's Procedure Mix

Heather provided diagnostic, preventive, restorative and periodontic procedures. Table 2 displays the distribution of these services by percentage over the three years reported. The dental therapist's significant contribution to restorative care is apparent. For example, in 2016, 58% of services Heather provided were restorative care compared to 18% diagnostic, and 24% preventive and 3% periodontal.

**Table 2. Advanced Dental Therapist mix of services**
**Gross Production, Count, and Percentage by category 2014-2016**

| | Diagnostic Gross (count) | Diagnostic % | Preventive Gross (%) | Preventive % | Restorative Gross (count) | Restorative % | Perio Gross (count) | Perio % |
|---|---|---|---|---|---|---|---|---|
| 2014 | $7276 (151) | 17% | $12,064 (174) | 29% | $22, 297 (116) | 53% | $254 (1) | <1% |
| 2015 | $3457 (109) | 14% | $5170 (68) | 21% | $15,973 (76) | 64% | $219 (1) | <1% |
| 2016 | $9342 (172) | 18% | $10,308 (136) | 20% | $29,901 (138) | 58% | $1616 (7) | 3% |

Using 2016 data, Table 3 provides greater specificity about the most commonly performed procedures within each treatment category. One, two, and three surface glass ionomer restorations were the most common restorative treatments provided. Placement of glass ionomers is an indicator of the priority placed on stabilizing the oral health of this population, highlighting the capacity of dental therapists to meet the restorative needs of long-term care residents.

**Table 3. Advanced Dental Therapist at the Veterans Home 2016**
**Most frequently provided procedures by Category of Service**
**(90% or greater count per category of service)**

**Diagnostic**

| Code | Description | Count | Gross Revenue |
|---|---|---|---|
| **D0120** | Periodic oral evaluation-established patient | 112 | $6,048 |
| **D0274a** | Bitewing X-rays (four films) | 23 | $1,426 |
| **D0220a** | Periapical (first film) | 12 | $348 |
| **D0230a** | Periapical (each additional) | 8 | $216 |
| **D0210a** | Intraoral x-rays complete series | 3 | $4,201 |
| **Diagnostic Totals** | | 158<br>92% of dx count | $8,458<br>91% of dx revenue |

## Preventive

| Code | Description | Count | Gross Revenue |
|---|---|---|---|
| **D1110** | Prophylaxis-adult | 74 | $7,030 |
| **D1206** | Topical application of fluoride varnish | 39 | $1,755 |
| **D1110b** | Prophylaxis-adult lower | 11 | $583 |
| **D1110c** | Prophylaxis-adult, 3 month | 6 | $570 |
| **D1354*** | Interim caries arresting medicament application | 5 | $275 |
| **Preventive Totals** | | 135<br>99% of px total | $10,213<br>99% of px revenue |

* D1354 / Silver Diamine Fluoride was piloted at Apple Tree during the study period but not in LTC settings until late in the period of the case study.

## Restorative

| Code | Description | Count | Gross Revenue |
|---|---|---|---|
| **D2331a** | Glass ionomer - two surface, anterior | 34 | $7,548 |
| **D2392a** | Glass ionomer - two surface, posterior | 20 | $5,200 |
| **D2391a** | Glass ionomer - one surface, posterior | 21 | $3,801 |
| **D2330a** | Glass ionomer – one surface, anterior | 18 | $2,970 |
| **D2332a** | Glass ionomer – three surface, anterior | 10 | $2,750 |
| **D2150** | Amalgam – two surface | 8 | $1,352 |
| **D2160** | Amalgam – three surface | 6 | $1,218 |
| **D2393** | Resin-based composite – three surfaces, posterior | 3 | $966 |
| **D2920** | Re-cement or re-bond crown | 3 | $273 |
| **D2394** | Resin-based composite – four or more surfaces, posterior | 2 | $644 |
| **Restorative Totals** | | 125<br>91% of rest. count | $26,722<br>89% of rest. rev. |

## Periodontics

| Code | Description | Count | Gross Revenue |
|---|---|---|---|
| **D4341** | Periodontal scaling/root planing- four or more teeth per quad | 4 | $980 |
| **D4355** | Full mouth debridement to enable comprehensive evaluation | 2 | $438 |
| **D4342** | Periodontal scaling/root planing- one to three teeth per quad | 1 | $198 |
| **Periodontal Totals** | | 7<br>100% of perio count | $1,616<br>100 % of perio rev. |

## Heather's Impact on Practice Economics

Table 4 displays monthly gross production and days of operation for Dr. Cernohous and Heather Luebben during the final months of the study period, August through December 2016. This timeframe represents full operation of the on-site care team and highlights the dental therapist's impact on practice economics. Days when the dentist provided supervision to dental therapy students were eliminated from analysis, to compare only fully scheduled clinical days. During this time the dentist and the ADT provided care on the same number of clinic days and each had gross daily earnings over $3000, ($3,618 (dentist) compared to $3,003 (ADT). The procedure mix of the two providers is not identical, complicating a one-to-one comparison of revenue production. However, a lower cost provider producing comparable gross production to a more highly paid one will positively impact practice economics.

Equipment, supplies, and materials have similar costs across provider types. Regardless of the providers who make up the on-site clinical team, the costs of delivering and setting up the mobile dental office are the same. However, employment costs for a dentist are greater than for a dental therapist. Apple Tree's average daily employment cost of three Twin Cities mobile dentists, working full time with full benefits, was $628. The comparable figure for the advanced dental therapist providing care at the Veterans Home was $406. Theoretically, this is equivalent to an annualized difference of $52,000 in employment costs between a dentist and an advanced dental therapist working 234 clinic days/year.

In Apple Tree's team-based care model, the advanced dental therapist increased the amount of diagnostic and restorative services provided. This is especially important in the Veterans Home setting, where the goal was to provide the maximum amount of

care within a "capped" total budget defined by the contract. This same cost effectiveness can be anticipated in *any* setting where underserved populations with inadequate reimbursements make providing dental care financially challenging.

**Table 4. Monthly Gross Dental Production and Number of Clinic Days for Dentist and Advanced Dental Therapist, Veterans Home, August through December, 2016**

| Month 2016 | Cernohous Gross | Cernohous Days* | Heather Gross | Heather Days |
|---|---|---|---|---|
| August | $9,890 | 3 | $12,194 | 4 |
| September | $12,692 | 4 | $11,006 | 4 |
| October | $3,182 | 1 | $6,641 | 2 |
| November | $11,418 | 2 | $5,525 | 2 |
| December | $9,863 | 3 | $3,676 | 1 |
| **Totals** | $47,045 | 13 | $39,042 | 13 |
| **Per day averages** | $3,618 | | $3,003 | |

* For purposes of comparison, excludes dentist's student supervision days and associated gross/day

## Portion of Needed Dental Care within the scope of practice of an ADT

An ADT's scope of practice includes the scope of practice of the dental assistant, dental hygienist, and dental therapist or all *non-dentist* services provided by all of the other provider types.

Table 5 was created using actual gross revenue generated for services provided by Apple Tree during 2014 to 2016. Maximum theoretical scope of practice for the ADT excludes services reserved for the dentist in the Minnesota practice act. Similarly, maximum theoretical scope of practice for the CODA-approved dental therapist excludes services not designated in the Accreditation Standards for Dental Therapy Education Programs (2015). The interpretation of CODA standards used in this case study is discussed below.

**Table 5. Percentage of Procedures Provided by All Members of the Apple Tree Dental Team at Veterans Home, with *theoretical maximums* that could have been provided by Minnesota Advanced Dental Therapist or CODA Dental Therapist**

| Apple Tree Dental Veterans Home | All providers: Actual Gross revenue | MN Dual Licensed RDH/ADT Maximum Theoretical % Gross revenue | CODA Dental Therapist Maximum Theoretical % Gross revenue |
|---|---|---|---|
| 2014 | $188,729 | 87 | 72 |
| 2015 | $207,063 | 82 | 70 |
| 2016 | $204,025 | 85 | 72 |

Theoretically, the ADT could have produced 82-87% of the gross revenue based on scope of practice for the services provided during that time period. However, because of Apple Tree practice protocols, the actual percentage is lower. For example, while ADTs scope of practice includes extracting permanent teeth, the dentist performed all extractions at the Veterans Home. In addition, the on-site care team during this three-year period included a DT, DH and dental assistants who performed preventive services and x-rays within their scope of practice, as well as that of the ADT.

Theoretically, the CODA dental therapist could have produced 71% of the gross revenue based on scope of practice for the services provided during this same time period. The CODA dental therapist has a slightly narrower scope of practice than the Minnesota ADT. Specifically, we interpreted CODA to exclude all examinations (limited and periodic examinations are within the Minnesota ADT's allowable duties), periodontal services other than dressing change, adult extractions, dentures other than minor repairs and adjustments, consultation and sedation. Including periodic and limited examinations, under a broadened interpretation of CODA standards, would increase production figures by an additional eight percentage points. Theoretically, using this broader interpretation of the CODA scope of practice, 79% of the gross revenue could have been generated by a dental therapist. In states choosing to include examinations, dental therapists could determine and manage the treatment needs of long-term care residents. In either case, it is likely that the provision of care will be distributed among the on-site care team based upon a variety of practical considerations including scheduling, time off/leave of absence, terms of the collaborative management agreements, etc..

In the Apple Tree Dental delivery model, the theoretic maximums are over-estimates because, for efficiency, each team member works at the top of his or her license. For

example, although taking x-rays is within the practice scope of ADTs and DTs, the dental assistant or the dental hygienist would likely take x-rays. A more "real world" estimate for the percentage of services that a dental therapist, (non-dual licensed) could provide would be closer to 50%, excluding the hygiene scope services.

## Conclusion

This case study illustrates that a dental therapist functioning within her scope of practice served as a safe, cost-effective, and productive member of an on-site care team serving long-term care residents, even those with significant medical needs and limited resources.

## Case Study Contributors

Apple Tree Dental: Dr. Michael J. Helgeson, CEO; Deborah Jacobi, Policy Director; Brenda Prosa, Information Systems Director; Apple Tree Dental staff and patients

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