



Physicians Caring for Texans

TexMed 2017 Clinical Abstract

Please complete all of the following sections and include supporting charts and graphs in this document. Submit a total of two documents - this document and the Biographical Data and Disclosure Form to posters@texmed.org by midnight March 17, 2017.

Procedure and Selection Criteria

- Submissions not directly related to quality improvement or research may be accepted and should follow the standardized format outlined below. Content should enhance knowledge in the field of clinical care and be relevant to a given patient population.

PROJECT NAME: Shift Work is Associated with Altered Semen Parameters in Infertile Men

Institution or Practice Name: Baylor College of Medicine, Department of Urology

Setting of Care: Department of Urology; Male Fertility Clinic

Primary Author: Taylor P. Kohn

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Is the Primary Author, Secondary Author or Member of Project Team a TMA member (required)?

Yes No

Please provide name(s) and their role in the project:

TMA Member Name: Taylor Kohn

TexMed Poster Session Specialty Subject Area: Please check if these apply.

Enhanced Perioperative Recovery

Disaster Medicine and Emergency Preparedness

Clinical

Background (15 points max): Describe the purpose for sharing the content. What caused this subject matter to be approached? Why is this content important to share? What is the potential impact if this content is not shared?

Shift work has been shown to negatively impacts circadian rhythms and the hypothalamic–pituitary–gonadal axis. Spermatogenesis is dependent on this axis, yet male infertility has never been studied before when evaluating shift work status. Here we examine the impact of shift work on semen parameters and reproductive hormones in infertile men.

Intended Stakeholders (15 points max): Identify those individuals, organizations, or interest groups that could be potentially impacted by this information or benefit by obtaining this information.

It is estimated that 2-5% of Americans perform shift work and of these shift workers a large majority are of reproductive age. While early research has demonstrated that shift work is associated with an increased risk of developing diabetes mellitus, gastric ulcers, breast cancer, cardiovascular disease, and myocardial infarctions, infertility has never previously been studied.

Description of Accomplished Work (25 points max): Provide an overview of the work that was accomplished, including any specific methods, tools or techniques. Also, include any milestones or key accomplishments. Note charts, graphs and tables here and send as addendum with abstract form.

Men presenting with infertility to an academic andrology clinic between January 2014 and October 2016 completed shift work and sleep quality surveys and had semen analysis and hormone testing. Infertile men with no known genetic or obstructive causes of infertility were included. Fertile men, defined as having fathered a child within the past 5 years, were used as controls and underwent the same hormonal and semen testing and completed the above surveys.

The analysis comprised 198 men: 75 infertile shift workers, 96 infertile non-shift workers, and 27 fertile controls. When comparing shift to non-shift workers, male age, female age, and duration of infertility were not different (**Table 1**). Sperm density, total motile count (TMC), and testosterone levels were lower in shift workers ($P=0.012, 0.019, 0.026$, respectively). No differences in semen volume, sperm motility, LH or FSH levels were observed. When comparing infertile shift workers to fertile controls, higher sperm density and TMC, and lower LH and FSH, were observed among controls. Semen parameters among infertile men were regressed against sleep quality, sleep quantity, and difficulty sleeping. The TMC of men with moderate sleep difficulty was 15.4 M sperm/mL greater than men with no difficulty sleeping, and 4.72 M sperm/mL greater than men with severe sleep difficulty ($p=0.018$). This inverse U-shaped trend was also observed for sleep quality, but only approached significance.

Timeframe and Budget (20 points max): Provide the start and end dates for the work along with any financial implications that were incurred due to the work accomplished. Note charts, graphs and tables here and send as addendum with abstract form.

All surveys were completed by men presenting to an academic andrology clinic between January 2014 and October 2016 and consented to participate in this IRB-approved study. Funding for this project was provided by Male Reproductive Health Research (MRHR to DJL) Career Development Physician-Scientist Award (Grant # HD073917-01) from the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) Program. Funding was used for the purchasing of iPad minis on which the surveys were taken.

Intended Use (25 points max): Describe how this information could be used moving forward to impact patient care.

Infertile shift workers have worse semen parameters when compared to non-shift workers, consistent with alterations in the HPG axis observed in shift workers. Sleep quality influences TMC, but this relationship follows a U-shaped, rather than linear, trend.

In male infertility 20 million total motile count is considered the lower limit of normal. In our cohort, shift work is associated with a TMC of 16.6 million while men who did not perform shift work had on average TMC of 27.8 million sperm. This difference in sperm count is the difference between referring couples for expensive assisted reproductive techniques such as intrauterine insemination or *in vitro fertilization* versus encouraging a couple to continue attempting to conceive naturally.

Common treatments for shift work and circadian rhythm disorders include proper sleep hygiene (e.g not watching television or texting an hour before bed, limiting day time naps, and exercising), using pharmaceuticals such as melatonin and modafinil to improve sleep rhythms, or even temporarily stopping shift-work. These simple solutions may be a much-less-costly option for infertile men who perform shift work when compared to the costs of assisted reproductive techniques as men with low sperm counts are often referred for *in vitro fertilization* – a procedure that costs \$14,000 per cycle. While further studied are needed to determine if circadian-improving treatment will improve semen parameters, these early findings indicate that shift work is associated with worse semen parameters in men presenting for an infertility evaluation.

Group	N	Male Age (years)	Female Age (years)	Infertility (Months)	Volume (mL)	Density (10^6 sperm/mL)	Motility (%)	Forward Progression	TMC (10^6 motile sperm)	LH (mIU/mL)	FSH (mIU/mL)	Estradiol (ng/dL)	Testosterone (ng/dL)
Non-Shift Workers	96	36.1	32.6	28.4	2.79	22.0	42.0	2.11	27.8	4.83	5.16	3.51	400.0
Shift Workers	75	36.3	32.3	24.8	3.50	14.9	40.3	2.02	16.6	4.36	6.43	3.50	332.0
<i>p-value</i>		0.7668	0.712	0.396	0.398	0.012	0.560	0.077	0.019	0.370	0.129	0.978	0.026
Group	N	Male Age	Female Age	Infertility	Volume	Density	Motility	Forward	TMC	LH	FSH	Estradiol	Testosterone
Fertile Pre-TTh	27	33.6	--	--	2.20	33.0	52.1	2.31	37.7	2.31	3.06	2.72	333.7
Shift Workers	75	36.3	32.3	24.8	3.50	14.9	40.3	2.02	16.6	4.36	6.43	3.50	332.0
<i>p-value</i>		0.033	--	--	0.461	0.0001	0.003	0.0001	0.0001	0.0004	0.005	0.173	0.844

Table 1: Comparison of semen parameters in shift workers, non-shift workers, and fertile controls. Two-sided T-test was performed.