

Appendix G

Acronyms and Glossary of Terms

Acronyms

AAMC	—Association of American Medical Colleges	R.N.	—registered nurse
ACGME	—Accreditation Council for Graduate Medical Education	RRC	—Residency Review Committee
ADAMHA	—Alcohol, Drug Abuse, and Mental Health Administration	SAD	—seasonal affective disorder
AFOSR	—Air Force Office of Scientific Research	SCN	—suprachiasmatic nucleus
AMA	—American Medical Association	SWS	—slow wave sleep
BLS	—Bureau of Labor Statistics	USAARL	—U.S. Army Aeromedical Research Laboratory
CMSS	—Council of Medical Specialty Societies	USARI	—U.S. Army Research Institute
CPS	—Current Population Survey	USARIEM	—U.S. Army Institute of Environmental Medicine
CRISP	—Computer Retrieval of Information on Scientific Projects	w	—ultraviolet
CWW	—compressed workweek	VA	—Department of Veterans Affairs
DOT	—Department of Transportation	VNTSC	—Volpe National Transportation Systems Center
EOWEO	—every other weekend off	WRAIR	—Walter Reed Army Institute of Research
EPI	—Eysenck Personality Inventory		
FAA	—Federal Aviation Administration		
FHWA	—Federal Highway Administration		
FLSA	—Fair Labor Standards Act, 128		
FRA	—Federal Railroad Administration		
FREIDA	—Fellowship in Residency Electronic Interactive Database Access System		
FUDR	—5-fluoro-2deoxyuridine		
HSA	—Hours of Service Act		
LMRA	—Labor-Management Relations Act		
L.P.N.	—licensed practical nurse		
MARAD	—Maritime Administration		
MCSA	—Motor Carrier Safety Act		
MSHA	—Mine Safety and Health Administration		
NASA	—National Aeronautics and Space Administration		
NIH	—National Institutes of Health		
NIOSH	—National Institute for Occupational Safety and Health		
NRC	—Nuclear Regulatory Commission		
NSF	—National Science Foundation		
NTSB	—National Transportation Safety Board		
ONR	—Office of Naval Research		
OSH Act	—Occupational Safety and Health Act		
OSHA	—Occupational Safety and Health Administration		
OTA	—Office of Technology Assessment		
PGY	—postgraduate year		
POMS	—Profile of Mood States		
PRC	—phase response curve		
QES	—Quality of Employment Survey		
QUALPACS	—Quality Patient Care Scale		
REM	—rapid eye movement		

Glossary

Advanced sleep phase syndrome: A disorder in which falling asleep and waking occur earlier than usual; it is caused by diminished length and amplitude of the circadian cycle. The syndrome is common among elderly persons. Compare *delayed sleep phase syndrome*, *non-24-hour sleep-wake disorder*.

Amplitude: As it relates to circadian rhythms, the difference between the maximum or minimum and mean values of a function (e.g., body temperature) during the circadian cycle. Amplitude provides a measure of fluctuation within a cycle.

Attending physician: A physician who has completed all phases of the medical education process and whose job is teaching house staff. Compare *house staff*, *resident*.

Bargaining in good faith: Deliberation, discussion, or conference concerning the terms of a proposed agreement in which both parties agree not to take any unconscientious advantage of the other, even through technicalities of law. See *collective bargaining*.

Benzodiazepines: A class of hypnotic drugs, including Valium, under investigation for effects on circadian rhythms.

Biological rhythm: Self-sustained, cyclic change in a physiological process or behavioral function of an organism that repeats at regular intervals. See *circadian rhythm*, *infradian rhythm*, *ultradian rhythm*.

Biorhythm: One of three postulated cycles that control human behavior and performance; biorhythms have no scientific basis.

Body clock: The internal mechanism of the body that controls biological rhythms. See *circadian pacemaker*.

Bright light: As it relates to circadian rhythms, light with an intensity of at least 2,500 lux, which is equivalent to outdoor light at dawn. Bright light has been shown

- to shift circadian rhythms and has been used to treat seasonal affective disorder, some sleep disorders, and jet lag.
- Chronobiology:** The scientific study of the effect of time on living systems, including the study of biological rhythms.
- Circadian clock:** See *circadian pacemaker*.
- Circadian cycle:** The 24-hour interval between recurrences of a defined phase of a circadian rhythm. See *circadian rhythm*.
- Circadian pacemaker:** An internal timekeeping mechanism capable of driving or coordinating circadian rhythms. See *circadian rhythm, suprachiasmatic nucleus*.
- Circadian rhythm:** A self-sustained biological rhythm which in an organism's natural environment is normally synchronized to a 24-hour period. See *biological rhythm*.
- Circadian rhythm desynchronization:** See *circadian rhythm disruption*.
- Circadian rhythm disruption:** Disorganization among an organism's internal cycles or desynchrony between self-generated rhythms and the 24-hour cycle in the environment.
- Clockwise shift rotation:** A work schedule in which the shifts move forward, from day to evening to night. See *rotating shift*; compare *counterclockwise shift rotation*.
- Collective bargaining:** A procedure whereby an employer and accredited representatives of employees bargain in good faith concerning wages, hours, and other conditions of employment. See *bargaining in good faith*.
- Combat operations:** Direct involvement in fighting. Compare *combat support*.
- Combat support:** Provision of supply, communications, or medical aid to fighting units. Compare *combat operations*.
- Common carrier:** A transportation system that undertakes to carry all persons or goods as long as there is room and there is no legal reason for refusal.
- Compressed workweek:** A schedule in which employees work approximately 40 hours in fewer than 5 days.
- Condition I Battle Readiness:** The naval equivalent of sustained operations; all systems on board a ship are manned and operating, and no routine maintenance is conducted. See *sustained operations*.
- Condition II Battle Readiness:** In the Navy, required operational systems on board a ship are continuously manned and operating, and only essential preventive maintenance and support functions are carried out.
- Continuous operations:** A military situation requiring around-the-clock manpower but not extended duty hours for individuals. Compare *sustained operations*; see *extended duty hours*.
- Cortisol:** A steroid hormone secreted by humans; cortisol secretion exhibits a circadian rhythm and is used as a marker for the body's pacemaker.
- Counterclockwise shift rotation:** A work schedule in which the shifts move backward, from night to evening to day. See *rotating shift*; compare *clockwise shift rotation*.
- Current Population Survey:** A survey of 55,000 to 60,000 sample households conducted monthly by the Bureau of the Census for the Bureau of Labor Statistics. Supplements to the survey have incorporated questions on shift work
- Day shift:** As defined in Current Population Surveys, a period of work in which half or more of the hours worked are between 8 a.m. and 4 p.m.
- Delayed sleep phase syndrome:** Abnormal delay of the timing of sleep onset and waking, possibly caused by either an abnormally long circadian cycle or a diminished responsiveness to environmental cues. The disorder is most common among teenagers and young adults. Compare *advanced sleep phase syndrome, non-24-hour sleep-wake disorder*.
- Deployment:** Movement of a military unit to a strategically important location. Deployment can be routine (planned and scheduled well in advance) or surge (done on short notice).
- Diurnal:** Being active during the day.
- Double shift:** Two consecutive shifts worked in one 24-hour period.
- Entraining agent:** A factor that synchronizes an organism's biological rhythms to the outside world; for example, the light-dark cycle is an entraining agent for circadian rhythms.
- Environmental cue:** A signal from outside an organism that prompts it to some action.
- Evening person:** A general term used to describe an individual who has difficulty waking up, is able to sleep late in the morning, and finds it difficult to fall asleep at night. Compare *morning person*.
- Evening shift:** As defined by the Current Population Survey, a period of work in which half or more of the hours worked are between 4 p.m. and midnight.
- Extended duty hours:** Long periods of work (usually over 12 hours) that cause a worker to get less than usual or no sleep.
- Fatigue:** Weariness caused by physical and mental exertion.
- Field study:** In this report, an investigation in which a researcher observes workers in their actual work environment. Compare *laboratory study, survey study*.
- Fixed shift:** A work schedule in which the hours of work remain the same from day to day. Compare *rotating shift, irregular shift*.
- Flexitime:** A system in which starting and stopping hours of work are determined by the individual worker, with a required number of total hours specified by the

- employer. Usually there is a daily core period when all workers must be present.
- Free-running rhythm:** Circadian rhythm operating in the absence of environmental cues; such rhythms may be 20 to 28 hours in length. Under free-running conditions, the human body clock has a circadian rhythm of about 25 hours.
- Full-time employment:** A job consisting of 35 or more hours of work per week. Compare *part-time employment, shortened workweek*.
- General quarters:** In the Navy, high-alert or combat conditions at sea. See *Condition I Battle Readiness*.
- Graduate Medical Education:** Formal medical education, including substantial clinical experience, beyond the M.D. degree. See *residency, resident*.
- House officer:** See *house staff*.
- House staff:** Intern, resident physician, or fellow at a teaching hospital. See *resident*.
- Infradian rhythm:** A biological rhythm with a cycle of more than 24 hours; for example, the human menstrual cycle. See *biological rhythm*; compare *ultradian rhythm*.
- Intern:** A first-year resident physician. See *resident*.
- Internal clock:** See *circadian pacemaker*.
- Internal desynchronization:** Loss of synchronization among rhythms within a single organism.
- Irregular shift:** A work schedule that is variable and erratic. Compare fixed *shift, rotating shift*.
- Jet lag:** The malaise associated with travel across time zones; it results from conflict between the traveler's internal clock and the external rhythms in the new time zone.
- Laboratory study:** In this report, an investigation in which the researcher attempts to simulate the workplace in a controlled environment. Compare *field Study, SURvey study*.
- Longitudinal study:** Analysis of a function in the same experimental subjects over a period of time; especially useful in determining effects that vary widely among individuals.
- Maximum allowable flight duty period:** The maximum number of hours an Air Force crew can fly in a certain type of aircraft in a 24-hour period.
- Melatonin:** A hormone produced by the pineal gland, which is present in many animals, including humans. Melatonin secretion is circadian, and production is readily inhibited by light. Melatonin is being investigated as a possible circadian entraining agent in humans. See *entraining agent*.
- Microsleep:** Brief episode of sleep experienced by a person who is so tired that he or she cannot resist sleep.
- Moonlighting:** Holding more than one job.
- Morning person:** A general term used to describe an individual who wakes up easily, has difficulty sleeping late, and falls asleep quickly at night. Compare *evening person*.
- Neuron:** A nerve cell, the basic functional unit of the nervous system.
- Neurotransmitter:** Specialized chemical messenger synthesized and released by neurons to communicate with other nerve cells.
- Night float:** A shift of physicians sent in at approximately 10 p.m. to relieve residents who have worked all day and evening.
- Night shift:** As defined in the Current Population Survey, a period of work in which half or more of the hours worked are between midnight and 8 a.m.
- Night shift paralysis:** A rare condition marked by short-term paralysis, usually lasting about 2 minutes, during which individuals are aware of their surroundings but are unable to move; it is associated with extreme sleep deprivation.
- Nocturnal:** Being active at night.
- Nonflight support:** Airfield operations, aircraft repair, communications, and other activities in support of Air Force flight units. Compare *tactical forces, transport forces*.
- Non-REM sleep:** The four stages of sleep during which the sleeper does not experience rapid eye movement (REM) sleep. See *slow wave sleep, rapid eye movement (REM) sleep*.
- Nonstandard work schedule:** See *shift work*.
- Non-24-hour sleep-wake disorder:** The condition of going to sleep and waking up at progressively later times, possibly caused by the inability to perceive light-dark cycles. The disorder appears to be prevalent among blind persons. Compare *advanced sleep phase syndrome, delayed sleep phase syndrome*.
- Notice:** Information, advice, or written warning intended to notify a person of some proceeding in which his or her interests are involved or informing him or her of some fact that it is his or her right to know and that is the duty of the notifying party to communicate.
- Opposed landing:** In the Marines, coming ashore against armed opposition; opposed landings involve a very intense period of sustained operations, changing to continuous operations. See *continuous operations, sustained operations*.
- Overtime:** Time worked at one job in excess of 40 hours per week. Overtime may be required or voluntary.
- Part-time employment:** A job consisting of fewer than 35 hours of work per week. Compare *full-time employment, shortened workweek, shared time*.
- Per gene:** A hereditary unit in the fruit fly (*Drosophila melanogaster*) that appears to regulate the organism's circadian rhythms.
- Phase response curve:** Direction and amount of shifting of an organism's circadian rhythms plotted in response to an environmental cue, such as light. See *phase shift*.
- Phase shift:** The resetting of an organism's internal clock in response to an entraining agent. The organism's circadian rhythms may be advanced, delayed, or not

- shifted at all, depending on the timing of exposure. See *entraining agent*.
- Pineal gland:** A small structure in the brain that produces the hormone melatonin. It is responsive to light and in some species, such as birds, it is the circadian pacemaker.
- Rapid eye movement (REM) sleep:** Stage of sleep during which the eyes move rapidly, brain activity resembles that observed during wakefulness, heart rate and respiration increase and become erratic, and vivid dreams are frequent. REM sleep alternates with non-REM sleep in cycles lasting 90 to 100 minutes. Compare *slow wave sleep*.
- Registered nurse (R.N.):** A person who has received a baccalaureate degree in nursing.
- Reinforcement:** Sending more personnel and equipment to units already deployed. See *deployment*.
- Relocation:** Transporting a military unit to another location. Compare *deployment*.
- Residency:** Training program in a medical or surgical specialty for postgraduate M.D.s. Residencies generally last from 3 to 7 years, depending on the specialty. See *graduate medical education*.
- Resident, resident physician:** A postgraduate (post-M.D.) medical trainee in a medical or surgical specialty.
- Rotating shift:** Work in which the hours change regularly, for example from a day to an evening to a night shift. Rotation may be rapid (e.g., 3 days), mid length (e.g., 1 week), or long (e.g., 4 weeks); it may proceed forward, as noted above, or backward (day to night to evening). Compare *fixed shift, irregular shift*.
- Routine operations:** See *continuous operations*.
- Rulemaking:** The procedure that allows administrative government agencies to promulgate rules to implement, interpret, or prescribe law or policy, or to describe the organization, procedure, or practice requirements of an agency.
- Seasonal affective disorder (SAD):** Recurring autumn or winter depression that may be helped by treatment with bright light. Although SAD has not been proved to be a circadian rhythm disorder, it has been hypothesized that changes in circadian rhythms cause the disorder.
- Shared time:** A work schedule in which two persons share one full-time job.
- Shift maladaptation syndrome:** A combination of ailments arising from the inability of some workers to adjust to long-term shift work.
- Shift work:** As used in this report, any nonstandard work schedule (including evening or night shifts, rotating shifts, split shifts, and extended duty hours) in which most of the hours worked are outside the period between 8 a.m. and 4 p.m. See *day shift, evening shift, night shift, rotating shift, split shift, extended duty hours*.
- Shift worker:** A person who works a nonstandard schedule. See *shift work*.
- Shortened workweek:** A schedule of full-time employment that entails 35 or fewer hours of work per week.
- Sleep debt:** The state of chronic fatigue and sleepiness that results from the lack of sufficient sleep or disrupted sleep. See *fatigue, sleep deprivation*.
- Sleep deprivation:** Lack of sufficient sleep. Compare *fatigue*.
- Slow wave sleep:** The stages of sleep during which the eyes do not move, heart rate and respiration are slow and steady, muscles show little movement, and dreams are infrequent. Compare *rapid eye movement (REM) sleep*.
- Special operations:** Military operations, such as search and rescue missions and counterterrorism activities, which take place as the need arises, are often classified, and often require the rapid deployment of personnel.
- Split shift:** A schedule of full-time work in which a period of work is followed by a break and then another period of work.
- Standard work schedule:** See *day shift*.
- Standing watch:** In the Navy, working a shift. See *watch*.
- Strategic forces:** Air Force units that man nuclear bombers and missile silos.
- Stressor:** A source of stress; as used in this report, disruption of circadian rhythms, fatigue and disruption of sleep, and social and domestic disturbances caused by shift work.
- Subjective day:** The portion of an organism's internal cycle that normally occurs during the day.
- Subjective night:** The portion of an organism's internal cycle that normally occurs during the night.
- Suprachiasmatic nucleus:** A region of the brain of mammals that acts as an organism's primary circadian pacemaker, controlling or coordinating its circadian rhythms. See *circadian pacemaker*.
- Surge operations:** Military activities carried out under conditions requiring speed. See *sustained operations*.
- Survey study:** In this report, an investigation in which the researcher asks the worker questions and elicits answers, usually in one or two interviews or classroomlike sessions. Survey studies are often conducted before and after an intervention in order to gauge its impact. Compare field *study, laboratory study*.
- Sustained operations:** A military situation requiring individuals to work extended duty hours, i.e., longer than 12 hours. Combat and high-alert operations are generally sustained. Compare *continuous operations; see extended duty "hours*.
- Tactical forces:** Air Force units that engage in combat and often support land warfare. Compare *transport forces*.
- Transmeridian flight:** Travel across time zones. See *jet lag*.

Transport forces: Air Force units that fly personnel and materiel from location to location. Compare *tactical forces*.

Ultradian rhythm: A biological rhythm with a cycle of less than 24 hours; human sleep cycles and the release of some hormones are examples. See *biological rhythm*; compare *infradian rhythm*.

Watch: In the Navy, a work shift. Watches are frequently scheduled on a rotating basis. See *rotating shift*.

Weekend shift: A work schedule in which a separate work force is used to work 12 hours per day, 2 days per week