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Short for Trouble: Perspectives on Error-Prone Abbreviations

by John H. Dirckx, M.D.

The illegibility of doctors' handwriting is one of the most pervasive and enduring elements of American folklore. But, unlike the spontaneous combustion of oily rags, the flatness of policemen's feet, and the intellectual deficiencies of blondes, this urban legend is firmly grounded in fact. Doctors really do write sloppily, and that has had, and continues to have, major implications for the profession of medical transcription.

A century ago, virtually all medical records were handwritten. Physicians entered histories, physicals, consultations, and operative reports as well as progress notes and orders in office or hospital records in longhand. Then as now, however, the specimens of doctors' handwriting most often seen by the laity were prescriptions, and it is chiefly through them that the medical profession has earned its public reputation for slovenly penpersonship.

It is significant, in this connection, that until about 1950 prescriptions were routinely composed in pharmaceutical Latin, a bastard dialect loosely based on the classical language and boiled down by tradition to a vast lexicon of abbreviations (a few of which survive to this day). In those days much of the difficulty experienced by a lay person in trying to interpret a prescription arose from the fact that it contained scarcely a word of English, rather than from messy handwriting. It was quite generally believed (not without some foundation) that physicians communicated with pharmacists in this murky cipher for the express purpose of keeping patients in ignorance of what medicines they were taking.

Although illegible handwriting is inexcusable in so critical a field as healthcare, it isn't inexplicable. Most physicians, whether in residency, private practice, or salaried position, run a perpetual race with the clock during their working hours. Time irrevocably lost in interviewing a garrulous or taciturn patient, performing a procedure where everything goes wrong, dealing with an emergency, or just handling an inopportune telephone call tends to be made up by various shortcuts, including the frenzied scribbling of medical records and orders.

The substitution of "hen tracks" for neat script, driven by chronic haste and by the brain-numbing routine of writing the same things many times every day, quickly becomes habitual. A physician's primary focus is, or ought to be, gathering and analyzing data and making therapeutic decisions in the best interests of each patient. By comparison, the duty to write tidily tends to recede into the background.

During the twentieth century, evolving standards of hospital practice led medical records committees to decree that certain components of the hospital record must be typewritten from physicians' dictation. No doubt many factors contributed to this development, including an ever-expanding and ever more diversified medical vocabulary and the availability of increasingly sophisticated machinery for recording dictation. But if doctors had been writing all along like schoolteachers, hospital administrators and others charged with oversight of healthcare activities would have had far less incentive to establish dictation and transcription as a norm.

As it became obvious that basic secretarial training was a hopelessly inadequate background for transcribing medical dictation, the profession of medical transcription was born. Today the majority of physicians no doubt view the dictation and transcription of medical records as a way to save time—their time—rather than as a method of improving the accuracy and utility of records by avoiding handwriting altogether and involving a second trained healthcare professional, the medical transcriptionist, in the process of their generation.

Problems

Although major components of hospital records as well as many physicians' clinic or office records are now routinely transcribed in print from dictation, outpatient prescriptions and orders entered in patients' hospital charts are still virtually always handwritten. Whereas ambiguity or downright error in the text of a history and physical or an operative report probably poses greater danger of legal trouble for the physician than of medical trouble for the patient, mistakes in the interpretation of handwritten drug orders and prescriptions constitute a colossal and scandalous blot on the quality of American healthcare.

The following definition of a **medication error** has been adopted by the National Coordinating Council for Medication Error Reporting and Prevention: *Any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the healthcare professional, patient, or consumer*. This definition includes mistakes made by patients themselves but excludes adverse effects of drugs due to allergy, sensitivity, or idiosyncrasy when no error has been committed.

Approximately 1.3 million people are harmed each year in the United States by medication errors so defined. A study by the Institute of Medicine in 1999 placed the annual number of hospital deaths in the U.S. due to all errors between 44,000 and 98,000. Another report set the number of these deaths as high as 180,000 annually. It has been estimated that in inten-

sive care units (ICUs) the medication error rate is about 15% of all doses ordered.

Although medication errors can arise from many sources (choice of a wrong medicine or dose by a physician, incorrect dispensing of drugs by pharmacists, incorrect administration by nurses, improper product labeling and packaging), mistakes made by pharmacists in reading prescriptions and by nurses in reading drug orders in hospital charts account for an enormous number of adverse drug consequences and deaths each year.

The U.S. Food and Drug Administration (FDA) receives reports of medication errors from healthcare providers through MedWatch, its adverse event reporting program, as well as from from drug manufacturers, the publisher of the U.S. Pharmacopeia, and the Institute for Safe Medication Practices (ISMP). In an FDA study of fatal medication errors from 1993 to 1998, the most common error (41% of the total) was administration of the wrong dose. Giving the wrong drug and using the wrong route of administration each accounted for 16% of fatal events.

Because such statistics are based on reports of known harmful consequences, they don't reflect cases in which administration of the wrong drug or the wrong dose either caused no harm or remained undetected. The actual incidence of errors (known and unknown, harmful and innocuous) in which misreading of a handwritten order leads to administration of a drug or dose different from what was ordered could well be several times that shown in official statistics.

Analysis of known medication errors points to recurring problems in the reading of numerals and in the interpretation of a relatively small number of short forms (abbreviations, acronyms, and symbols). Every short form, regardless of the field to which it pertains, represents a sacrifice of intelligibility and specificity for the sake of saving time, space, or both. As an arbitrary equivalent of a fuller expression, an abbreviation may be unknown to many who are familiar with the fuller expression, and it may also happen to be identical to another abbreviation or acronym of entirely different purport. Thus, *MS* can stand for eith*er magnesium sulfate* or *morphine sulfate,* and *HS* can mean either *half strength* or *hora somni* (=*bedtime*).

Besides these inherently ambiguous abbreviations, which are equally problematic whether handwritten or in print, a second group of abbreviations have been identified as error-prone when handwritten with less than exemplary neatness. For example, a sloppy *U* can look like *0, 4,* or *cc*. *QD*, *QID*, and *QOD* can each be mistaken for one of the others. Certain symbols and marks of punctuation are easily misread even when written with care. For example, the virgule (/) is often mistaken for the numeral 1, the arrowhead (>) for the numeral 7. Numerals themselves, which constitute a special class of short forms, easily become ambiguous when crudely written.

In the metric system the prefix *micro-* means 'one millionth'. One thousandth of a millimeter (0.001 mm), being one millionth of a meter (0.000,001 m), is therefore designated a *micrometer*. For many decades the shorter form *micron* was routinely substituted for *micrometer*. The symbol chosen for this unit (at a time when no standard typewriter marketed in the English-speaking world had Greek letters) was the Greek letter *mu* (μ).

Today the majority of physicians no doubt view the dictation and transcription of medical records as a way to save time—their time—rather than as a method of improving the accuracy and utility of records by avoiding handwriting altogether and involving a second trained healthcare professional, the medical transcriptionist, in the process of their generation.

When, in the 1960s, the metric system was reborn as the International System of Units (SI, Système International d'Unités), *micron* was discarded as an alternative term for *micrometer*. But the alien symbol μ became the official abbreviation for the prefix *micro-*: μm = micrometer; μg = microgram; μmol = micromole. As a consequence of this ill-advised choice, μg (microgram) in drug orders has repeatedly been misread as *mg* (milligram), occasionally with fatal results. Moreover, medical transcriptionists who didn't have (or couldn't find) a Greek or symbol font on their computers have made a practice of substituting lowercase *u* for μ, another invitation to disaster.

Solutions

In 2001, ISMP published a list of problematic abbreviations, acronyms, and symbols that are inherently ambiguous or, when written by hand, potentially so. Two years later the Joint Commission on Accreditation of Healthcare Organizations (JCAHO or Joint Commission) launched a vigorous program to reduce medication errors and published its own list (abridged from the ISMP document) of error-prone short forms and symbols (see box, p. 16). The use of any of these was prohibited as of 1 January 2004 in hospitals, clinics, and other institutions subject to JCAHO oversight. The ban extended not only to handwritten orders and records but to printed material as well, including computer-generated reports and printed forms and documents.

The purpose of the latter stipulation was to purge selected error-prone abbreviations from the medical vocabulary altogether. Although printed *cc* isn't likely to be mistaken for *U*, the continued appearance of *cc* in print legitimizes and perpetuates that abbreviation, guaranteeing that it will continue to appear in handwritten materials as well. In view of the time and expense involved in replacing printed forms and in reprogramming computer software, compliance surveyors looked only at handwritten records during 2004 and 2005.

By now, most U.S. healthcare institutions that are subject to JCAHO surveillance have achieved moderately good compliance rates, and many have established standards that embody the original ISMP list. Some hospitals prohibit the

JCAHO List of Error-Prone Abbreviations and Other Brief Forms (reformatted)

Form	Meaning	Problem	Solution
AD	auris dextra (right ear)	Misread as OD.	Write "right ear."
AS	auris sinistra (left ear)	Misread as OS.	Write "left ear."
AU	auris utraque (each ear)	Misread as OU.	Write "each ear."
cc	cubic centimeter	Misread as U, 4.	Write "mL."
D/C	discharge *or* discontinue	Ambiguous.	Write "discharge" or "discontinue."
HS (H.S., h.s.)	half strength *or* hora somni (bedtime)	Ambiguous.	Write "half strength" or "at bedtime."
IU (I.U.)	international unit	Misread as IV or 10.	Write "international unit(s)."
MS	magnesium sulfate *or* morphine sulfate	Ambiguous.	Write "magnesium sulfate" or "morphine sulfate."
μg	microgram	Misread as mg.	Write "mcg" or "microgram."
OD	oculus dexter (right eye)	Misread as AD.	Write "right eye."
OS	oculus sinister (left eye)	Misread as AS.	Write "left eye."
OU	oculus uterque (each eye)	Misread as AU.	Write "each eye."
QD, q.d.	quaque die (every day)	Misread as QID or QOD.	Write "daily" or "every day."
QOD, q.o.d.	every other day	Misread as QD or QID.	Write "every other day."
QHS, q.h.s.	quaque hora somni (every night at bedtime)	Misread as QH.	Write "at bedtime."
TIW, t.i.w.	three times a week	Misread as TID.	Write "3 times weekly."
U	unit	Misread as 0, 4, cc.	Write "unit(s)."
Zero, leading	zero to left of decimal point	Without leading zero, decimal point can be missed.	Never omit leading zero. (0.5 cm; 0.25 mg; 0.1%; 0.5 mL)
Zero, trailing	zero to right of decimal point	Multiples number by 10 if decimal point is missed.	Never insert trailing zero.

use of any abbreviations whatsoever for drug names (e.g., HCTZ for hydrochlorothiazide), and most do not permit any abbreviations in informed consent forms.

As might be expected, physicians have been the source of most problems of noncompliance. Even those who have managed to overcome their normal resistance to change and have made efforts to improve their handwriting must still struggle daily against deeply ingrained habits. The abbreviation *q.d.* has proved to be the most difficult to eradicate from handwritten medication orders.

The second edition of *The AAMT Book of Style* (*BOS*), published in 2002, contains the ISMP list as Appendix B. The entry for *abbreviations* in *BOS* provides a rational and balanced set of guidelines for the professional medical transcriptionist. The following summary is not claimed to cover all the points made on this topic in the *Book of Style*.

1. Dictated metric or SI units accompanied by numerals are always abbreviated ("two centimeters" = 2 cm). These abbreviations are never followed by periods (except at the end of a sentence) and are never pluralized with *s*.

2. Commonly used and widely recognized brief forms (CBC, lab) may be transcribed when so dictated or may be expanded. (AAMT does not countenance routine expansion of dictated abbreviations as a means of increasing keystroke counts.)

3. When a less frequently used or ambiguous abbreviation is dictated, it is to be expanded when it first occurs, the abbreviation being placed in parenthesis after the full form: arteriosclerotic heart disease (ASHD). If the abbreviation is dictated again in the same document, it may be transcribed as such, except in a diagnosis or impression.

4. Acronyms and initialisms (GERD, PTCA) are never used in an entry headed DIAGNOSIS or OPERATIVE REPORT.

Problems with the Solutions

As often happens with brand-new rules and policies, some of the restrictions on abbreviations and other brief forms have turned out to be ill-conceived, while others have been widely misinterpreted.

The simplest of all punctuation marks, the period (**.**), also doing business as the decimal point, sometimes causes trouble in handwritten material by being misinterpreted as a comma or the numeral one, but more often by being overlooked altogether. Failing to observe a decimal point in a written numeral can lead to a catastrophe of logarithmic proportions.

In practice most of the problems with decimal points occur in conjunction with zeroes. In a decimal expression less than one, all meaningful numerals appear to the right of the decimal point. In order to prevent that decimal point from being overlooked, it is routine to precede it by a zero. Thus, 0.25 mg rather than .25 mg. The failure to insert the **leading zero** in handwritten drug orders has led to countless errors because the decimal point was overlooked.

[T]he Joint Commission's position . . . We would consider it inappropriate for a transcriptionist to interpret or speculate on the intended meaning of any dictation that is not clear. If a "do not use" term is used in the dictation and the dictation is clear, that term should be transcribed as spoken; not translated or edited into its presumed meaning. . . .

Conversely, the insertion of a zero to the right of the decimal point in the expression of an integer (whole number) multiplies that number by 10 if the decimal point happens to go unnoticed. Thus, for example, 5.0 units could be misread as 50 units. Moreover, placing a zero in the last place at any distance to the right of a decimal point risks misinterpretation: 2.50 mg could be mistaken for 250 mg.

The prohibition of the **trailing zero** is entirely reasonable in the context of medication errors, which are ISMP's and JCAHO's primary focus, and should be carefully observed by the medical transcriptionist in recording drug dosages. But medical transcriptionists have to deal with many kinds of numerals besides those pertaining to drug dosages, including laboratory test results, measures of length, weight, and volume, and even sums of money. With some of these, omitting one or more final zeroes to the right of the decimal point can seriously misrepresent a numerical value.

In physics and chemistry the number of decimal places (numerals to the right of the decimal point) reflects the precision of a measurement. If a laboratory test that is accurate to one thousandth of a milligram per liter (0.001 mg/L) happens to yield a result of exactly 7, the correct way to write that result is 7.000 mg/L. It is no more appropriate to round off a urine specific gravity of 1.010 to 1.01 than it is to write $12.50 as $12.5. **Clearly JCAHO's prohibition of the trailing zero refers only to drug dosages and not to test results or other kinds of measurement.**

ISMP (but not JCAHO) has created an awkward dilemma for physicians and medical transcriptionists by advising against using the **virgule** (/) in expressions of drug dosage or concentration. Recognizing that a handwritten virgule can easily be mistaken for the numeral one, ISMP recommends that physicians write the word *per* instead of using the virgule in these settings.

To the administrations of some institutions it has therefore seemed logical to require MTs to transcribe dictated "per" as the word *per* and, in fact, never to type a virgule. This blanket ruling overlooks several facts: the virgule is a standard component of mathematical notation, it has many meanings besides *per* in mathematics and especially in phar-

maceutical nomenclature, and the danger of its being mistaken in print for another mark is very much less than in manuscript.

The use of the virgule to express division (hence also fractions and concentrations) in mathematics, physics, chemistry, and other exact sciences is a centuries-old tradition. It remains an approved symbol for those applications in SI, alongside the alternative use of a negative exponent with the unit that would appear in the denominator if the quantity were expressed as a fraction (2.25 mmol/L = 2.25 mmol L^{-1}). The substitution of the latter format for the virgule in medicine will take many decades, if it ever occurs at all.

A virgule incorporated in the proprietary name of a drug can have any of several meanings:

1. *Actual individual doses of two components in a combination product*. Each tablet of Ortho-Novum 1/35 contains 1 mg of norethindrone and 35 mcg of ethinyl estradiol.

2. *The number of dosage units (tablets) of a certain strength*. A month's supply of Ortho-Novum 10/11 includes 10 white tablets with 0.5 mg of norethindrone and 11 peach tablets with 1 mg of norethindrone. A month's supply of Nortrel 7/7/7 contains 7 yellow, 7 blue, and 7 peach tablets, each color representing a different dose of norethindrone.

3. *The proportion (not absolute dose) of two components*. Humulin 70/30 contains 70% NPH insulin and 30% regular insulin (both in the standard concentration of 100 units/mL).

4. *Other*. Menomune A/C/Y/W-135 contains vaccines intended to stimulate immunity to those four types of meningococcus.

It is just as wrong to substitute *per* for the virgule in any of these expressions as it would be to transcribe the fraction *two thirds (2/3)* as *2 per 3*. Replacing the virgule with *per* is appropriate *only* when the mark indicates a proportion or concentration: 2.7 mmol/L does indeed mean "two point seven millimoles per liter" and 2.2 g/24 h means "two point two grams per twenty-four hours."

When Does 1 Not Equal 1?

The story of the liter is a skeleton in the metrologists' closet, an embarrassing chapter in an otherwise impressive record of scientific precision and social utility.

An often-overlooked consequence of the French Revolution was the establishment, in 1793, of a standardized system of weights and measures that came to be called the metric system and gradually achieved worldwide application. One of the original units in this system was the *liter* (French and British *litre*). Named for an obsolete French measure, the *litron*, and roughly equivalent to the English quart, the liter was officially defined as the volume of a cube whose sides are 10 cm or 0.1 m (thus, 1 liter = 1 cubic decimeter).

The unit of mass chosen for the metric system was the *gram* (French and British *gramme*), defined as the weight of one cubic centimeter of pure water. A simple calculation shows that a liter was thus, by definition, precisely the volume occupied by one kilogram of water. This worked out beautifully on paper, but when three-dimensional standards were constructed to provide official and permanent bases for reference and comparison, it was discovered that one liter actually occupied 1.000,028 cubic decimeters!

Physicists, chemists, and metrologists tolerated this discrepancy for more than a century. At length in 1901 the Third General Conference on Weights and Measures (Conférence Générale de Poids et Mesures, CGPM) sought to resolve the confusion by officially redefining the liter as the volume occupied by one kilogram of water, hence 1.000,028 cubic decimeters rather than exactly 1.000,000 cubic decimeter.

The progress of the physical sciences during the twentieth century created a demand for increasingly precise measurements. The adoption of SI during the 1960s brought metrology into the modern era, providing needed new units and new terminology while eliminating a number of awkward and outmoded concepts.

In SI the kilogram, not the gram, is the basic unit of mass. Officially the kilogram is the mass of a platinum-iridium bar preserved at the headquarters of the International Bureau of Weights and Measures in Paris. The gram is now simply defined as one thousandth of a kilogram.

In 1964 the Twelfth General Conference on Weights and Measures touched off a storm of controversy when it (1) redefined the liter as the volume of exactly one kilogram of water and then (2) rejected it as an official SI unit. The Conference condescendingly agreed to permit the continued use of the liter, thus defined, in trade and in scientific work of low precision (for example, clinical chemistry).

Because the discrepancy between the milliliter (mL) and the cubic centimeter (cc) is far too slight to affect the precision of drug doses or the results of clinical laboratory tests, these two units are virtually identical in medicine. As early as 1966, both the International Union for Pure and Applied Chemistry (IUPAC) and the International Federation of Clinical Chemistry (IFCC) officially chose the liter rather than the cubic meter (or its submultiple the cubic decimeter) as the preferred unit of volume in expressing concentrations. That's why SI concentrations in clinical chemistry are expressed as moles per liter (mol/L) instead of as kilomoles per cubic meter (kmol/m^3).

History Is Full of Dictators

Dictation and transcription have been going on for thousands of years.

To the general public the term *dictator* denotes an absolute or tyrannical ruler. In republican Rome the term referred to an interim public administrator appointed to lead the nation in time of war. The most celebrated example is Julius Caesar, who also achieved fame as another kind of dictator. According to one of the many anecdotes surrounding this larger-than-life figure, he could keep six or seven scribes busy at once while dictating a different letter to each one.

In ancient Egypt the scribes formed a literate elite. In cultures with a high rate of illiteracy, people who could read and write have carried on a brisk trade, from remote antiquity to the present, handling the correspondence of the peasantry and sometimes that of the nobility or royalty as well.

Countless shorthand methods have been developed throughout history to enable speech to be recorded on paper at the speed at which it is uttered. Besides rapidity of recording, shorthand takes up less space on the page and can be used as a cipher to protect confidential records or messages.

Shorthand was used by the ancient Egyptians, Hebrews, and Greeks. Tiro, the private secretary of the Roman statesman and orator Cicero, devised an early system that found use in military dispatches and in recording senate speeches and debates. Widely taught, Tironian shorthand eventually lost its value as a cipher but remained in use for more than a thousand years in administrative and ecclesiastical circles. The Latin word *notarius* 'shorthand writer' (literally 'maker of marks') is the source of English *notary* and French *notaire* 'lawyer'.

Shorthand systems developed for writing English include those of Timothy Bright (1588), John Willis (1602), Thomas Shelton (early 1600s), William Mason (1672), Thomas Gurney (1750), and John Byrom (1776). Willis called his method stenography, a term later extended to include all methods. The English naval administrator Samuel Pepys (1633-1703) wrote his celebrated diary in Shelton's shorthand. The fledgling writer Charles Dickens used the Gurney method to record parliamentary deliberations for the London *True Sun* in the 1830s. In the New World, both Benjamin Franklin and Thomas Jefferson used forms of shorthand.

Early shorthand methods were largely phonetic, providing a distinctive symbol for each distinctive speech sound. But many of them also incorporated abstract or conceptual elements. Most were so complicated that they required not only a knack for grasping and retaining such material but also prolonged and intensive study. During the nineteenth century the steady expansion of commerce and industry called for a shorthand method that could be learned quickly and used efficiently by persons of average intelligence. (In those days virtually all clerks and secretaries were men.)

In 1786 Samuel Taylor published a simpler form of shorthand based on Byrom's method. Samuel Pitman, a schoolmaster who favored a reformed phonetic spelling, further modified Taylor's shorthand and in 1837 published his own system, which he termed phonography. During the next several decades the Pitman system became the principal one for both court reporting and commercial applications.

John Robert Gregg, a native of Ireland, published his system in England in 1867. Although Gregg shorthand was easier to learn than Pitman's, it made little headway against the older method until Gregg brought it to the United States. By the 1920s, Gregg shorthand was by far the most widely taught and used in this country.

The invention of the stenotype machine by Ward Stone, an American, about a hundred years ago led to the eventual abandonment of shorthand for court reporting. Meanwhile, an even earlier invention had already begun to make shorthand writing obsolete for some other applications.

Thomas Edison's epoch-making invention of the mechanical phonograph took place in 1877. Although not blind to the possibility of recording musical and dramatic performances and the words of celebrated persons in their own voices for posterity, Edison recognized the poor fidelity of the early machines and envisioned his invention as primarily a boon to the commercial world. (The words *record* and *recording*, still used today, certainly have clerical rather than artistic connotations.) The earliest form of talking machine inscribed a helical groove in a layer of tin or copper foil wrapped around a wooden cylinder. Edison suggested that businessmen could now dispense with clerks and carry on their correspondence with nearly total privacy by dictating their letters to his machines and then *mailing the cylinders back and forth!*

The machine eventually marketed by the Edison Records Company was called the Ediphone. The name Dictaphone was trademarked by an American firm, the Columbia Graphophone Company, in 1907. In 1923 Dictaphone became a separate company. Early dictating machines were strictly mechanical and cut grooves in reusable cylinders covered with hard wax. Electronic microphones came into use during the 1930s, and cylinders were replaced successively by vinyl disks, vinyl bands, and magnetic tape.

Because JCAHO has included printed materials in its ban on certain short forms and symbols, many transcriptionists have been saddled by their employers with the responsibility of editing physicians' dictation to achieve compliance. However, involvement of MTs in the enforcement of rules on abbreviations has never been part of JCAHO policy, as is evident from the following statement by Richard J. Croteau, M.D., Executive Director for Patient Safety Initiatives, Joint Commission on Accreditation of Healthcare Organizations:

> [T]he Joint Commission's position concerning responsibility for compliance with National Patient Safety Goal #2B ("Do not use" abbreviations and other terms) is that the author is, in the first instance, responsible and, when an individual is unable or unwilling to comply with the requirements, it is the responsibility of the medical staff, in the case of physicians, and the healthcare organization, in the case of employed staff, to take appropriate action. "Author," in this context, includes a person who dictates documentation to be transcribed. We would consider it inappropriate for a transcriptionist to interpret or speculate on the intended meaning of any dictation that is not clear. If a "do not use" term is used in the dictation and the dictation is clear, that term should be transcribed as spoken; not translated or edited into its presumed meaning. If the dictation is not clear, then there must be a mechanism by which the originator can clarify it.

In standard MT practice, that mechanism is flagging the questionable abbreviation. Obviously an institutional rule or policy that forces medical transcriptionists to shoulder part of the burden of compliance with JCAHO standards on error-prone abbreviations is neither fair nor in keeping with the intent of JCAHO.

Those of us with gray hair and wrinkles remember that standard typewriters had no key for the numeral one, the lowercase ell serving that function. In many modern printing and computer fonts, lowercase ell, the numeral one, and capital eye are virtually identical. Hence even in print the abbreviation *l* (lowercase ell) for *liter* has frequently been mistaken for the numeral one.

For that reason, international metrologic authorities have long suggested the use of capital ell (*L*) for *liter* instead of lowercase *l*. Although that usage is now mandated by the U.S. Department of Commerce, in SI it remains only an acceptable alternative to the official lowercase *l*. (Indeed, the liter itself remains only an acceptable alternative to the cubic decimeter; see box, p. 18.) Lowercase *l* as an abbreviation for *liter* (also *ml* and *dl* instead of *mL* and *dL*) can still be seen in both handwritten and printed material, and in both media they are almost equally dangerous. It therefore seems odd that neither ISMP nor JCAHO included the lowercase ell as an abbreviation for *liter* in their lists of prohibited short forms.

At the beginning of this article I remarked that the sloppiness of doctors' handwriting has had, and continues to have, implications for MTs. Having virtually called the medical transcription profession into being during the later twentieth century, that same proclivity for messy handwriting now exerts a powerful influence on transcription practice with respect to abbreviations, numerals, and other short forms, as healthcare agencies and institutions seek ways to reduce medication and other errors resulting from misinterpretation of handwritten orders.

An association between advanced education and illegible handwriting seems to be a very old tradition. *Docti male pingunt*, says an ancient Latin scrap of wisdom: "Scholars scribble." I don't know how many physicians nowadays deserve the title of scholar, but I feel sure there is absolutely no danger that enough of them will ever write neatly enough to jeopardize the future of medical transcription as a profession.

John H. Dirckx, M.D., is the author of *Laboratory Tests and Diagnostic Procedures in Medicine* (2004), *Human Diseases*, 2nd ed. (2003), *H&P: A Nonphysician's Guide to the Medical History and Physical Examination*, 3rd ed. (2001), published by Health Professions Institute. He is an editorial consultant to the publisher of Stedman's medical reference books and medical editor of HPI publications.