HEROES & MARTYRS OF QUALITY AND SAFETY

W Edwards Deming: father of quality management, patient and composer
M Best, D Neuhauser

“The right quality and uniformity are foundations of commerce, prosperity and peace.” W E Deming (1900–1993)

Variation causes waste. How could any one take these apparently simple ideas and turn them into the path to peace and prosperity? W Edwards Deming did. It took a long life and he changed the world.

WASTE NOT
William Edwards Deming, the first child of William Albert Deming and Pluma Irene Edwards, was born on 14 October 1900 in Sioux City, Iowa. His father worked mainly in freelance legal work and his mother gave music lessons on their grand Kimball piano. As a child, Deming grew up in meagre conditions. He and his family lived for years in a tarpaper shack. As a boy he worked at a hotel for $1.25 per week and he lit the town’s five gasoline street lamps every evening for $10.00 per month. These early years probably influenced formation of his frugal behavior, his attitude toward productivity and quality improvement, and his campaign against waste and processes that do not add value.

STATISTICS AND PSYCHOLOGY
In 1917 Deming started attending the University of Wyoming while working at several odd jobs to support himself. He played the drums and timpani in the university band, but switched to the piccolo in his second year as it was easier to transport to off campus events. He received his bachelor’s degree in electrical engineering in 1921, and in 1922 he married and took a job teaching physics at the Colorado School of Mines. He also attended classes at the University of Colorado and earned a master’s degree in mathematics and physics in 1925. Deming was encouraged to attend Yale to get a doctorate, and in 1928 he was awarded a doctorate in mathematical physics. While studying for his PhD, Deming taught at Yale as an instructor which paid $1000 per year.

In 1925 and 1926 Deming spent the summer months working at the Western Electric Hawthorne Plant. This plant was made famous by the experiments of Elton Mayo on worker productivity which resulted in the appreciation of the so-called “Hawthorne effect”. While at the Hawthorne plant in Chicago, Deming met Walter A Shewhart. Dr Shewhart became Deming’s mentor and taught him how to apply statistics to measure and control process variation. The understanding of variation became one of the key elements of the Deming philosophy. If you are making cars, your customers want doors that fit the body of the car—not too big that they will not close and not so small that they let in the rain. Patients treated off best practice guidelines receive unacceptable variation in care. Customers and patients should buy cars and seek care elsewhere. Such variation causes waste and harm. Without customers there will be no jobs, no prosperity, and, ultimately, no peace.

After completing his studies at Yale, Deming was presented with several job offers. He accepted a position studying the effects of nitrogen on crops with the United States Department of Agriculture (USDA) in the Fixed Nitrogen Research Laboratory in Washington DC. During his tenure at the USDA Deming published 24 papers, most of which discussed the physical properties of gases. In 1939 he accepted a job with the US Census Bureau where he published several papers on sampling and played a major part in deciding how the 1940 census was taken. While at the Census Bureau he applied statistical process control to the process of keypunching in order to improve the accuracy of the census questionnaire data. This increased productivity, decreased costs, and resulted in faster census results. He stayed with the Census Bureau until 1946 when he began his consulting practice and became professor of statistics at New York University. During his life time Deming contributed to almost 200 publications.

AMBASSADOR FOR QUALITY IMPROVEMENT
Beginning in early 1943 and lasting for about 2 years, Deming helped start a series of 8 week courses for industries involved in the war production efforts. These courses taught statistical process control (for understanding variation) and Plan, Do, Study, Act (PDSA) cycles (for generating new organizational knowledge). This resulted in reduced waste and improved quality of wartime production.

After the war, in 1947, to guide their rebuilding efforts, Deming advised General MacArthur’s Supreme Command of Allied Powers on sampling techniques for their 1951 census in Japan. During this time he met several Japanese statisticians and was made the first Honorary Member of the Japanese Statistical Society. In 1950 he was invited back to Japan by the Union of Japanese Scientists and Engineers (JUSE) to teach statistical methods for quality improvement. Over a period of 4 years, with Deming’s advice, the reputation of Japanese products changed from being equated with low quality to becoming the world leader in manufacturing excellence. In 1950 JUSE established the annual Deming Prizes consisting of a cash award, and a Deming Medal with an image of Deming and the inscription “The right quality & uniformity are foundations of commerce, prosperity, & peace.” In 1987 the USA initiated the Malcolm Baldrige National Quality Award which is an award equivalent to the Deming Prizes. In 1955 Deming received the Shewhart Medal from what is now the American Society for Quality. In May 1960 the Emperor of Japan awarded Deming the most esteemed honor that Japan can give a foreigner—the Second Order of the Sacred Treasure.

After World War II, in relation to the rest of the world, the USA was like an unstoppable train economically, despite good or bad management. But after a few decades the
productivity appeared to slow down relative to other countries. Deming saw this complacency and was saddened by the stagnation and lack of insight by American management. The 1970s were especially depressing. However, change was forced, as one after another major American company lost market share to the Japanese and faced the threat of bankruptcy. Then, in June 1980, NBC aired a television documentary titled “If Japan Can, Why Can’t We?” and Deming was interviewed. This was the turning point for his consulting career in the USA. Shortly thereafter he embarked on his series of famous 4 day seminars which continued until his death in 1993. These seminars are still being conducted in his name. In 1987—27 years after his recognition in Japan—President Reagan awarded Deming the National Medal of Technology for his work.

Deming’s philosophy of quality and the essentials to quality improvement are summarized in his “system of profound knowledge” which is composed of four key elements, and his “fourteen points of management”.3 4

The four key elements of his “system of profound knowledge” are:

- appreciation for a system;
- understanding variation;
- a theory of knowledge; and
- understanding psychology and human behaviour.

This means simultaneously seeing organizations as a set of interrelated processes with a common aim, understanding that processes have common cause and special cause variation, understanding how new knowledge is generated within an organization, and understanding how people are motivated and work in groups or teams in the organization.

His “fourteen points of management”3 4 are:

- Point 1: Create constancy of purpose towards improvement of product and service, with the aim to become competitive and to stay in business, and to provide jobs.
- Point 2: Adopt the new philosophy. We are in a new economic age. Western management must awaken to the challenge, must learn their responsibilities, and take on leadership for change.
- Point 3: Cease reliance on mass inspection to achieve quality. Eliminate the need for inspection on a mass basis by building quality into the product in the first place.
- Point 4: End the practice of awarding business on the basis of price tag. Instead, minimize total cost. Move toward a single supplier for any one item, on a long term relationship of loyalty and trust.
- Point 5: Improve constantly and forever the system of production and service, to improve quality and productivity, and thus constantly decrease costs.
- Point 6: Institute training on the job.
- Point 7: Institute leadership. The aim of supervision should be to help people and machines and gadgets to do a better job. Supervision of management is in need of overhaul, as well as supervision of production workers.
- Point 8: Drive out fear, so that everyone may work effectively for the company.
- Point 9: Break down barriers between departments. People in research, design, sales, and production must work as a team, to foresee problems of production and in use that may be encountered with the product or service.
- Point 10: Eliminate slogans, exhortations, and targets for the work force asking for zero defects and new levels of productivity. Such exhortations only create adversarial relationships, since the bulk of the causes of low quality and low productivity belong to the system and thus lie beyond the power of the work force.
- Point 11: Eliminate work standards (quotas) on the factory floor. Substitute leadership. Eliminate management by objectives. Eliminate management by the numbers, numerical goals. Substitute leadership.
- Point 12: Remove barriers that rob the hourly workers of their right to pride of workmanship. The responsibility of supervisors must be changed from mere numbers to quality. Remove barriers that rob people in management and in engineering of their right to pride of workmanship.
- Point 13: Institute a vigorous program of education and self-improvement.
- Point 14: Put everybody in the company to work to accomplish the transformation. The transformation is everybody’s job.

Leadership, organizational learning, cooperation, and systems thinking are critical to Deming’s message. In areas outside health care, several success stories of organizations using Deming’s methods have been published.

**BEING A PATIENT**

Deming believed that 80–85% of quality (or lack thereof) was due to management. The chairman of a large Department of Pathology recently stated: “Everyone in my department is concerned about quality”—as if there were no opportunities for improvement in health care because everyone was already making their best effort. As Deming stated: “We are being ruined by best efforts” and “Best efforts will not substitute for knowledge”. Deming stated: “There is an excuse for ignorance, but there is no way to avoid the consequences”. For an example of this in the 1800s, see the story of Ignaz Semmelweiss.6

Deming was once injured and had to spend several days in hospital. During this time he required a blood transfusion and intensive nursing care. He commented that the “nurses were working as hard as they could”. They were well educated, but discouraged and defeated by the broken system they had to work in. Why were registered nurses making beds? The patient’s shower was badly designed. Good food was served on cheap plates. Delays and delays. Treatments given varied from treatment prescribed. He recognized that the healthcare system had flaws but did not blame the people working in it. The design of this system to reduce unwanted variation in care could only be improved by a leadership that was obviously lacking.

**MUSICIAN AND COMPOSER**

As a young child Deming used to scribble on a piece of paper while stating that he was “writing music”. His mother would then take the paper, place it on the piano, and play a tune. She would then declare that he had written great music.

Deming went on to learn to play the drums, piano, organ, piccolo, and flute. He also composed over a dozen pieces of music, most of which are religious. He wrote a different version of music for the words to the national anthem of the USA “The Star Spangled Banner”. He said that he rewrote the national anthem to make it easier for the general public to sing. He redesigned the music to improve harmony and sound, and increase singer satisfaction and cooperation. Like Avedis Donabedian, Deming also wrote poetry. As far as we

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know, Deming’s music has never been recorded. Some of his compositions are to be found on the QSHC website (http://www.qshc.com/supplemental).

MAKING CHANGE HAPPEN

Deming taught that meeting customer (and patient) needs without variation takes leadership, systems thinking, constancy of purpose, and joy in daily work life. Unvaryingly good products and service would lead to employment, prosperity and peace. Deming was ultimately effective because he followed his own advice. When few people in the USA were ready to listen to him, he went to a country that was ready to listen and change—Japan. American managers listened decades later when they no longer had a choice. Unwanted advice, like a product with defects, has few customers. When corporations were ready to listen, Deming insisted on working with the senior leaders who were the ones who could correct the systematic problems in their organization. As a patient he saw that the nurses and doctors could not work any harder, but the broken systems they were forced to work in defeated their best efforts and robbed them of joy in work. He is a hero of quality because of his relentless pursuit and endorsement of increased performance and joy in working, his criticism of unemployment or underemployment, and his advocacy of waste reduction. He was one of the first to teach that a system gets the results that it gets due to its design, and that workers in the system are not to blame. Leaders must have a vision and managers must implement the steps necessary for redesigning the system to improve quality, job satisfaction, and reduce waste. Deming stated: “Management’s job is to optimize the whole system”.

How do we create healthcare services where the pressures on managers to improve the systems of care are continuous and intense? One way this might occur is through extensive public reporting of comparative healthcare performance data.

The sheet music of some of Deming’s compositions are available online at http://www.qshc.com/supplemental

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REFERENCES


Correction

The quality improvement report entitled “Improving medication management for patients: the effect of a pharmacist on post-admission ward rounds” (M Fertleman, N Barnett, and T Patel. Qual Saf Health Care 2005;14:207–211) was published in print with an omission from table 2. The corrected table can be viewed online at: http://qhc.bmjournals.com/cgi/content/full/14/3/207/DC2. doi: 10.1136/qshc.2004.11759corr1
The words from the Apocrypha

Benedictus es, Domine

The music by
W. EDWARDS DEMING, Ph.D.

Published by W. EDWARDS DEMING
4924 Butterworth Place, Washington

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prais'd and ex-alt-ed a-bove all for ev-er.

Bless-ed art thou in the

Bless-ed art thou that be-hold-est the depths, and dwell-est be-tween the Cher-u-bim:

praiz'd and ex-alt-ed a-bove all for ev-er.

Benedictus 4
Blessed art thou on the glorious throne of thy kingdom:

Praised and exalted above all for ever. Blessed art thou in the

Firmament of heav'n: praised and exalted above all for ever.

*There is no C nor C# in this chord; open fifth.

Benedictus
GLORIA

P Gloria be to the Father and to the Son, and to the

P
gt.

mf As it was

Ho - ly Ghost; As it was It was in the be - ginning, is now, and

was

cresc.

Senza Ped. Ped.

ev - er shall be, world with-out end. A - men,
To my friend Dr. Ralph Edward Gibson

BENEDICITE, OMNIA OPERA
or
The Song of the Three Holy Children

The words from the Apocrypha

Allegretto

O all ye Works of the Lord, bless ye the Lord: O ye Angels of the Lord,

HARmONY

bless ye the Lord: praise Him and magnify Him forever.

mf MEN'S VOICES

O ye Heavens, O ye Waters that be above the firmament, O all ye Powers of the Lord,

May be sung in unison if desired

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bless ye the Lord: praise Him, and magnify Him for ever.

O ye Sun and Moon, O ye Stars of heav'n, O ye Showers and Dew,

bless ye the Lord: praise Him and magnify Him for ever.

O ye Winds of God, O ye Fire and Heat, O ye Winter and Summer, bless ye the

Lord: praise Him and magnify Him for ever.
Men's Voices

f a tempo

O ye Dews and Frosts, O ye Frost and Cold, O ye Ice and Snow,

Harmony

praise Him, and magnify Him for ever.

bless ye the Lord:

Unison

O ye Nights and Days, O ye Light and Darkness, O ye Lightnings and Clouds,

Harmony

bless ye the Lord: praise Him, and magnify Him for ever.

Benedicite - 6
O let the Earth bless the Lord: yea, let it praise Him, and magnify Him for ever.

O ye Mountains and Hills, O all ye Green Things upon the earth, O ye Wells, O ye Seas and Floods,
bless ye the Lord: praise Him, and magnify Him for ever.

O ye Whales, and all that move in the waters, O all ye Fowls of the air, O all ye Beasts and
HARMONY

Cattle, O ye Children of Men, bless ye the Lord:

magnify Him for ever. O, let Israel bless the Lord:

praise Him and magnify Him for ever. {O ye Priests} {O ye Servants}
of the Lord, {of the Lord,}

O ye Spirits and Souls of the Righteous, {O ye holy} {and humble} Men of heart, bless ye the

Lord: praise Him, and magnify Him for ever.
(According to the American prayer book)

\[\text{decrecendo}\]

Let us bless the Father, and the Son, and the Holy Ghost: praise Him, and magnify Him for ever.

\[\text{dim. poco rit. p}\]

O Ananias, Azarius and Misael, bless ye the Lord:

\[\text{Men's Voices a tempo}\]

Harmony

\[f\] praise Him and magnify Him for ever.

\[p\] Glory be to the Father, and to the Son: And to the Holy Ghost; As it was in the beginning is now and was in the beginning shall be: World without end. \(\text{p Amen.}\)

Benedicite-6
Inscribed to
The Reverend H. H. D. Sterrett,
All Souls Memorial Church, Washington, D. C.

I BOW MY KNEES UNTO THE FATHER

Ephesians iii, 14-21. W. Edwards Deming

Andante sostenuto

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whom the whole fam-i-ly in heav’n and earth is named. Of whom the whole

fam-i-ly in heav’n and earth is named; That Christ may dwell in your

hearts by faith; That ye be-ing root-ed and ground-ed in love, may com-pre
hend with all saints, what is the breadth and length and depth and height, and

know the love of Christ, which passeth knowledge; That ye may be filled with all the

fulness of God, unto whom be glory throughout all ages, world without end. Amen.
Look Thou Upon Me

Sacred solo for baritone
In mode III
By
W. Edwards Deming

Words from Psalm 25

W. Edwards Deming
4924 Butterworth Place
Washington 20016
Tel. (202) 363.8552
LOOK THOU UPON ME

Part of Psalm 25
Sacred solo for baritone

W. Edwards Deming

In mode iii

Look thou upon me, O Lord, and have mercy upon me,
For I am alone and poor.
I am alone and poor.

Reeds: Ponderoso

Heed my repentance and my labour, and for-

P give me all my sins, // And for-
"give me all my sins, O my God."

"A tempo
Reeds, ponderoso"

"Declamando"

"ff O my God."
Messe du Jardin de Gethsémani

by

W. Edwards Deming, Ph.D.
March 1971

Price: 50 cents per copy

Dr. W. Edwards Deming
4924 Butterworth Place
WASHINGTON 20016
GLORIA IN EXCELSIS DEO

Energicamente e lesto

Glo-ry be to God on High, and on earth peace, good will towards men.
We praise thee, we bless thee, we wor-ship thee, we glo-ri-fy thee, we give thanks to thee for thy great glo-ry.

Declamando

O Lord God, heav’n-ly King, God the Fa-ther Al-might-y.

f Lento e deciso

O Lord, the on-ly be-got-ten Son, Je-sus Christ; O Lord God, Lamb of God,

f Diapason 8ve below

Soavamente

Son of the Fa-ther, that tak-est a-way the sins of the world, have
Thou that tak-est a-way the sins of the world, have mer-cy up-on us.

Thou that tak-est a-way the sins of the world, re-ceive our prayer. Thou that sit-est at the right hand of God the Father, have mer-cy up-on us. For thou on-ly art ho-ly; thou on-ly art the Lord; Thou only, O Christ, with the Ho-ly Ghost, art most high in the glo-ry of God the Fa-ther. A-men. G-lo-ry be to thee, O Lord.
Sanctus and Benedictus Qui Venit

Holy, Holy, Holy,

Lord God of Hosts. Heaven and earth are

decrescendo

P high, Blessed is he that cometh in the

name of the Lord. Hosanna in the highest, Hos-

san-na. In the highest, Hos-

san-na.
AGNUS DEI

O Lamb of God, that takest away the sins of the world, have mercy upon us.

O Lamb of God, that takest away the sins of the world, have mercy upon us.

O Lamb of God, that taketh away the sins of the world, Grant us thy peace.
MISSA SPIRITUI SANCTO

(Mass to the Holy Ghost)

Voices in unison
For choir or for congregational singing

by
W. Edwards Deming
GLORIA IN EXCELSIS DEO

Priest or Cantor

Gloria in excelsis Deo. Et in terra pax hoc

mini-bus bonae voluntatis. Laudamus te. Bene

decimus te. Adoramus te, glorificamus te.
Gratias agimus tibi propter magnum gloriam

Domine Deus, Rex coelestis. Deus

Pater omnipotens. Domine Fili unigenite
Jesus Christe. Domine Deus.

Agnus Dei Filius Patria. Qui tollis pecata mundi,

merere nobis. Qui tollis pecata mundi,
su - ci - pe de - pre - ca - ti - o - nem nos - tram. Qui
se-des ad dex-ter-am Pa-tris mi-se-re-re no-bis.
Qui

Quo-ni-am tu so-lus san-c-tus. Tu so-lus Do-mi-nus. Tu

Largando

Amen.
SANCTUS

Sanctus, Sanctus, Sanctus

Dominus Deus Sabbaoth.

Pleni sunt caeli et terra gloria tua. Homo
BENEDICTUS QUI VENIT

san - na in ex - cel - sie. Be - ne - dictus qui ve - nit in

no - mi - ne do - mi - ni. Ho - san - na in ex - cel - sie.

AGNUS DEI

A - gnus De - i, Qui tol - lis pece - ta mun - di,
misere re nobis. A gnus De i, Qui
tollis pec-cta mundi, misere re nobis.
A gnus De i, Qui tollis pec-cta mundi,
Do na nobis pacem. Do na nobis pacem.
Missa Reginae Caeli

by

W. Edwards Deming

Price: 50 cent per copy
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1976
Gloria in excelsis Deo

Energicamente e lesto

Glory be to God on High, and on earth peace, good will towards men. We praise thee, we (Priest or cantor)

Glory to God in the highest.

bless thee, we worship thee, we glorify thee, we give thanks to thee for

thy great glory, O Lord God, heav'n-ly King, God the Fa-ther Al-might-y.

0 Lord, the on-ly be-got-ten Son, Je-sus Christ; 0 Lord God, Lamb of God,

Son of the Fa-ther, that tak-eth away the sins of the world, have
mercy upon us. Thou that takest away the sins of the world, have mercy upon us.

Thou that takest away the sins of the world, receive our prayer. Thou that sittest at the right hand of God the Father, have mercy upon us. For thou only art holy; thou only art the Lord; Thou only, O Christ, with the Holy Ghost, art most high in the glory of God the Father. Amen. Amen. Amen. Amen. Glory be to thee, O Lord.
Adagio e marcato

mf
O Lamb of God, that takest away the sins of the world, have mercy upon us. O Lamb of God, that takest away the sins of the world, have mercy upon us.

 Organ

mf

0 Lamb of God, that takest away the

 Organ

meno moso

sins of the world. Grant us thy peace.
The Star Spangled Banner

Music by

W. Edwards Deming
The Star Spangled Banner
Words by Francis Scott Key

O say can you see by the dawn's early light,
What so proudly we hailed at the twilight's last gleaming,
Whose broad stripes and bright stars through the perilous
Fight, 'er the ramparts we watched, were so gallantly

O thus be it ever, when free men shall stand
Between their loved homes and the war's desolation!
Blest with victory and peace, may the heav'n-rescued

Key Bridge

Grandioso

W. Edwards Deming

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streaming and the rockets red glare, the bombs bursting in
nation! Then conquer we must, when our cause it is

air, gave proof through the night that our flag was still
just, And this be our motto: "In God is our

there. O say does that star spangled banner yet
trust!" And the star-spangled banner in triumph shall

wave o'er the land of the free and the home of the brave?
wave o'er the land of the free and the home of the brave?
Why do we need a new tune for our national anthem? (1) The usual well-known tune is unsingable; it embraces more than an octave and a half. (2) It is irregular. It spoils the beautiful poem by Francis Scott Key, which is in regular triple metre. (3) It is an English drinking song, and a poor one at that.