

Dental Immunization

URGENCY TO BUILD
EMPOWERMENT IN COMMUNITY

Irene Adyatmaka, Andreas Adyatmaka, Adang Bachtiar,
Bruce Donoff, David Manton and Jo Frencken



DENTAL IMMUNIZATION

URGENCY TO BUILD EMPOWERMENT IN COMMUNITY

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**Dr R. Bruce Donoff, Massachusetts (USA)
Dean and Walter C. Guralnick Distinguished
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Dr. R. Bruce Donoff was born in New York City. He attended Brooklyn College as an undergraduate, received his DMD from the Harvard School of Dental Medicine in 1967 and his MD from the Harvard Medical School in 1973. Dr. Donoff's professional career has centered on Harvard's

Faculty of Medicine and the Massachusetts General Hospital's Department of Oral and Maxillofacial Surgery. He began as an intern in 1967, served as Chairman and Chief of Service from 1982 through 1993, and continues to see patients today.

Dr. Donoff is the Dean of the Harvard School of Dental Medicine, a position to which he was named in 1991.

In addition to these responsibilities, Dr. Donoff has made major contributions in research to the specialty of oral and maxillofacial surgery with interests in wound healing, bone graft survival, sensory nerve repair and oral cancer. He has published over one hundred papers, authored textbooks, and lectured worldwide. He recently helped launch a new Harvard Initiative - Integrating Oral Health and Medicine, a project of great importance to him.

Dr. Donoff served twelve years on the Board of the Oral and Maxillofacial Surgery Foundation and is former President of the Friends of the National Institute of Dental and Craniofacial Research. He is the editor of the MGH Manual of Oral and Maxillofacial Surgery and a member of the Editorial Board of the Journal of Oral and Maxillofacial Surgery and the Massachusetts Dental Society Journal.

Dr. Donoff has received numerous honors during his academic career, including the American Association of Oral and Maxillofacial Surgeons Research Recognition Award, the William J. Gies Foundation Award for Oral and Maxillofacial Surgery, Fellow of the American Association for the Advancement of Science, the Alpha Omega Achievement Award and the Distinguished Alumni and Faculty Awards from the Harvard School of Dental Medicine. In 2014 he was a Shils-Meskin awardee for leadership in the dental profession.



**Prof. David John Manton BSc MSc
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Eldson Storey Chair of Child Dental
Health
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Graduated BSc (Melb) in 1984 and worked in general practice until 1991 when he undertook an MSc in Paediatric Dentistry. He was dental advisor to the Federal Government from 1994 – 1996 and won the KG Sutherland Prize of the RACDS in 2007. David is currently the Eldson Storey Chair of Child Dental Health and heads the section of Growth and Development at The University of Melbourne and is involved in several collaborative and postgraduate research projects in both paediatric dentistry and orthodontics. He is on the editorial boards of the European Archives on Paediatric Dentistry and the International Journal of Paediatric Dentistry, and the advisory panel of ORCA.

David has spoken throughout Australia, Asia and Europe and has wide ranging experience in laboratory and clinical trials of CPP-ACP, Minimum Intervention Dentistry and the detection of caries. He has published more than 80 manuscripts in peer-reviewed journals and his interests are in all aspects of enamel de- and remineralisation, minimal intervention dentistry, teledentistry, and molar incisor hypomineralisation (MIH).



J. Frencken

Associate Professor in Minimal Intervention Dentistry and Head of the Department of Global Oral Health at the Radboud University Nijmegen, the Netherlands before his retirement in 2015. He obtained a MSc degree in Dental Public Health from the University of London and a PhD degree from the University of Nijmegen. He has been employed as a private practitioner, researcher, university lecturer and policy maker in three African countries for 13 years between 1977 and 1997. He also served as an epidemiologist/researcher at the Netherlands Institute for Preventive Health Care for 3 years. His current interest covers minimal intervention dentistry c.q., prevention and minimal intervention techniques, in particular the Atraumatic Restorative Treatment approach for managing dental caries, and oral health services in deprived communities. He has published extensively (over 160 publications) with colleagues from many nations. He currently supervises 6 PhD candidates from 5 countries. The Academy of Dentistry International awarded him the title of ‘International Dentist-of-the-Year’ (1998-99) for his international leadership in the dental profession. He holds a Guest Professorship at the University of Wuhan, China and at the University of Cordoba, Argentina. He was awarded a Honorary Professorship at the Maimodines University in Buenos Aires, Argentina and a Doctor Honoris Causa from The National University of Cuya in Mendoza, Argentina in 2015. The Government of the People’s Republic of China awarded him the 2015-International Science and Technology Cooperation Prize, the first dentist ever to receive this prestigious Prize. The Swedish Panel Board awarded him with the 2016-Yngve Ericsson Prize in Preventive Odontology.

Dr Tony McLaughlan

Biosketch – October 2016

Tony graduated Bachelor of Dental Surgery from the University of Sydney in 1983 and his Master's in 1993. He worked at the Dental Clinical School at Westmead Hospital for 10 years after graduating before moving to ahm (Australian Health Management) where he was Senior Dentist and Director of Clinical Services for 10 years. He was appointed Clinical Consultant in October 2003 and then General Manager (and Director of Clinical Services) for the Dental & Eyecare Practices in October 2005. Tony was President and Managing Director of GC Asia in Singapore for eight years from August 2008 and has since moved back home to Sydney as Managing Director of GC Australasia.

Tony was an Honorary Clinical Tutor with the University of Sydney Faculty of Dentistry from 1985 to 2002 and appointed Senior Clinical Associate in 1993. He has lectured extensively throughout Australia and New Zealand on “four-handed dentistry” and infection control.

He was invited to be a Fellow of the International College of Dentists in 1995 and the Pierre Fauchard Academy in 1999. He was Director of Dental Services for the Sydney 2000 Olympic and Paralympic Games.

Tony’s recent clinical interest was in the area of Minimal Intervention Dentistry where he successfully completed a 12-month Pilot program (2004) with over 3,000 patients screened for caries risk. This resulted in the Practice-wide roll out of MI in 2005.



Dr. Andreas Adyatmaka, DDS, MSc

Graduated from Faculty of Dentistry Gajah Mada University in 1966, he was sent to Papua to join Operation Trikora. Operation Trikora is a Indonesian Military operation in order to liberate West Irian from Dutch's control. During his assignment in Papua, he did many social approach with local people, even people from churches, prisoners, etc. All district in Papua has been visited in order to give dental care, and also studied about health status of school children. Positioned early as dentist, promoted to dental health section chief, and finally as acting Regional office head of the provincial health office in Papua. After 10 years serving in Papua, because of his bravery, he was promoted to capital city and received prestigious Trikora award from the President Republic of Indonesia, Soeharto. He was recruited to serve in Ministry of Health since then, with the latest position as Director of Oral Health, Ministry of Health Republic of Indonesia. He got his postgraduate studies from Universitas Indonesia, specializing in Biostatistics, Faculty of Public Health. He got a chance to do many comparative studies in many countries, research cooperation within the country and abroad. He was active in FDI and IADR seminars. During his time as Director for Oral Health, he has been able to raise the position of oral health becoming the theme of National Health Day in 1997. He announced the oral health program, ART, throughout the country. With his established position and roles, now retiring, but still active in development of Innovative school oral health program / Dental Immunization.



Dr. Irene Adyatmaka, DDS, PhD

The daughter of Dr Andreas Adyatmaka, who was born in Papua, finished her dentistry in 1995. She joined the school oral health services of a private foundation, managing more than 10.000 students from 1996 - 2011. She was appointed as a single operator of ART approach by Ministry of Health R&D from 1996-1999. She had done more than 2,000 restorations using ART during the time.

She also worked together with Prof. Douglas Bratthall and translated the Cariogram Indonesian version. Her research on Carisolv with Mediteam Sweden has been also undertaken during that time.

She took a compulsory field work as a dentist in 2002-2005 in health centre, and chose to work as school oral health personnel managing 22 government schools in the area.

Her interest in dental public health made her took a doctoral degree in 2006 at Universitas Indonesia. Finished in 22 months and 2 days with cum laude, made her the best student and quickest doctoral degree and put into Indonesian world record. Now she was appointed as senior researcher at Center for Health Administration and Policy Studies, Faculty of Public Health, Universitas Indonesia. Her passion in research, teaching, and learning is even fulfilled by her position as a Research-methodology lecturer in Post-graduate department St. Carolus Nursing School and a GC Regional Manager for Indonesia and Brunei.

Together with Ministry of Education Republic of Indonesia and Faculty of Public Health UI, she developed her dissertation, Irene's Donut, into school oral health innovative program as a breakthrough of the conventional program. In 2011, the program was accepted as National policy by Ministry of Health and became MOH Regulation in 2015.



DR. ADANG BACHTIAR, MD.MPH.DSc

EDUCATION

Medical Doctor, from University of Indonesia, 1980

Master of Public Health, from Harvard University, USA, 1987

Doctor of Science, from Johns Hopkins University, USA, 1992

Post doctoral certificate in Advanced Statistics, from University of Michigan, USA, 1987

CURRENT ACTIVITIES

- Teaching Master and PhD students at medical, dental medicine, nursing, and public health schools at Univ of Indonesia, North Sumatera Univ, Andalas Univ, and others, with more 200 dissertations as result
- Co-investigator, iUKGS (Innovative School Oral Health National Program), since 2008 – expanded into Global Dental Immunization Initiatives.
- President, Indonesian Public Health Association (IPHA), 2007-2016 (Three consecutive periods), and now serving as Chairman of IPHA Advisory Board 2016-2019.
- Director of Centre for Health Administration and Policy Studies, University of Indonesia, 2008-2012
- Health Policy specialist, National TB Expert Committee, National TB Program of MoH, 2001-now
- Principal Investigator, 2016 National Health Survey of Litbangkes – Quality and Validation Team
- Principal Investigator, 2016 National Non-Communicable Diseases Survey of Litbangkes – Quality and Validation Team
- Member of Advisory Board of National Agency for HIV/AIDS Control with related ministers, e.g., Ministers of Health, Education, etc, 2008-now
- Member of Expert Committee for the Development of Healthcare service, at Remote areas, State Borderlines and Small Islands of the MoH, 2007-now
- Expert Panel Member, Health Research Committee for Health Lecturers of MoH
- Expert Panel Member, Public Health Research of National Institute for Health Research and Development, MoH
- 2015 Award Recipient of The APACPH Public Health Achievement
- 2016 Award Recipient of AIPTKMI Public Health Excellence

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About the Book

This book should be of interest to:



Dental health personnel who work in clinics and need new treatment menus for their patients

Dental health personnel who work in school oral health or community-based services and would like communities to take more responsibility and ownership of their own health

Policy makers in public health who want an effective and sustainable approach

Policy makers who have a limited budget or no budget for oral health

Non-dental health personnel who work in the community and would like to contribute more on oral health

Preface

After all these years, dental caries remains a big problem in the community, especially for children throughout the world. Many efforts have been made. As it is known, caries starts from a very early age, and if one is successful in stopping the disease, it may not continue to older age. In this book, the discussion is focused on children's oral health.

School oral health activities are highlighted because the school setting, which is common in every country in the world, is considered important in reaching people, especially for oral health literacy. However, in many countries these activities are no longer run for a variety of reasons, such as ineffective results compared to budget, bored and unmotivated health personnel, and even uncooperative school communities. In countries that still run these activities, there are potential problems. While oral health may not be prioritized, when there is funding, the activity can continue. When the funding ceases, the activity most likely stops.

This book offers an alternative solution, empowering the community and building ownership so that programs can be sustainable yet effective. One day when I talked about empowerment, my teacher, who happened to attend the meeting, said, "Let me tell you, empowerment is dead!" The empowerment process is often perceived as something that is not feasible because many people have tried and failed. Perhaps they failed because what they practiced was not empowerment. To be successful with empowerment, not only must one believe in it, but there are also several secrets that need to be followed. Those secrets will be revealed, in practical terms, in this book.

Indonesia's condition, from the richest to the poorest district, will be taken as an example. Indonesia is a developing country that includes more than 500 districts with decentralized budgets, massive oral health problems, and exhausted dental health personnel. If empowerment can work here, it may feasibly be done elsewhere.

This book includes chapters on innovative ways of caries prevention, which covers the Irene Donut caries risk assessment, remineralization therapy, and surface protection (mostly known as glass ionomer cement

[GIC] pit-and-fissure sealing). It is a great honor that the founders of some of these technologies, Professor David Manton and Professor Jo Frencken, were willing to contribute chapters in this book.

Apart from mastering dental materials and clinical techniques, one needs leadership, advocacy skills, and stakeholder identification in order to be successful with empowerment. I learned a great deal from the Dean of the Harvard School of Dental Medicine, Professor Bruce Donoff, who was willing to share an introduction about his experiences with many varied dental health activities.

Finally, after a 20-year journey in school oral health settings, this author will introduce the concept of “Dental Immunization.” The idea was cultivated from Professor Raman Bedi while he was sharing his thoughts about vaccination.

It was decided to brand the program as “Dental Immunization” for the following reasons:

1. Immunization is a program that is easily understood and accepted by communities
2. Governments usually establish a budget for immunization
3. Asking for a budget for an oral health program is expected to be easier under the name of Dental Immunization
4. Immunization is not merely a medical term, as “Financial Immunization” is a term in banking. This gave us confidence to create the new term “Dental Immunization.” For dental health practitioners, Dental Immunization can be established in clinics with great benefit to patients.

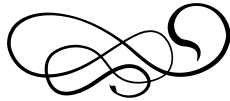
Last but not least, this is a free-flowing book. Please review the content, and you can freely jump from one chapter to another, based on your primary interest, without losing understanding.

Happy reading.

Irene Adyatmaka, DDS, PhD

Andreas Adyatmaka, DDS, MSc

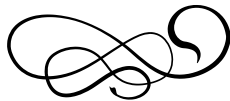
Adang Bachtiar, MD, MPH, DSc



How many times would you teach a child until he can ride a bike?

Empowerment is a similar process
Empowerment does not happen in one or two meetings

It is an ongoing necessary assistance
Until your community “can ride their bikes”



Introduction

Professor Bruce Donoff, DMD, MD

Dean and Walter Guralnick Distinguished Professor of Oral and
Maxillofacial Surgery

Harvard University

I first met Irene Adyatmaka at a meeting of the World Public Health Association that was held in conjunction with the meeting of the American Public Health Association in Boston in 2013. I listened to her presentation on assessment of caries risk and her program of parental involvement in the project, Innovative School Oral Health services. I was struck by her passion, vision, capacity for hard work, and ability to involve multiple stakeholders. I was amazed to see the carefully documented results of the initial program. I was inspired by the use of the term Dental Immunization. The use of the word “immunize” attracts understanding from all categories of health professionals and clearly drew the attention of the Ministry of Health in Indonesia. Oral health suffers from being the stepchild in all discussions of general health. Yet its importance to overall health and development, especially in children, is undeniable. The word “immunize” breaks down the medical–dental divide.

I consider the program of caries risk assessment by the Irene Donut method, remineralization therapy, demineralization and remineralization methods, surface protection, and Atraumatic Restorative Treatment (ART) an innovative and effective treatment plan. Calling it Dental Immunization is appropriate and equally innovative. When I think of ART, I think of antiretroviral therapy for HIV infection, but ART for Atraumatic Restorative Treatment is worthy of its own designation.

This represents a wonderful example of medical management of surgical disease. Ever since the physicians Barry Marshall and Robin Warren of Perth Western Australia won a Nobel Prize in Medicine in 2005 for the discovery that gastric ulcers are caused by bacteria, I have become enamored of the term. Their discovery of *Helicobacter pylori* was groundbreaking

and opened up the entire study of the human microbiome. In the current case of caries, I am sure that further study of the human oral microbiome, especially in the infant and young child, will lead to greater understanding of the caries process and potential solutions. In the meantime, treating incipient caries with remineralization and sealing occlusal surfaces of all elevated risk molars, both primary and permanent, offer other solutions for both the underdeveloped and developed world. I liken the concept of natural microbes being involved in human disease with the realization in the mid-1800s that cholera could be transmitted by water, when at the time airborne transmission of all diseases was thought to be the norm. It is also of note that parental involvement is an innovation when satisfactory auxiliary help is unavailable.

Edward D. Churchill said in the *New England Journal of Medicine* in 1951, “the most significant trend of the 20th century is that toward cultivating the discipline of mind needed to complement and guide surgical technology.” Not every diagnosis of dental caries requires the use of a drill. Dental Immunization as detailed in this book is especially useful in areas where there are insufficient dentists and dental nurses. But the lessons of this thoughtful innovation are transferable to all populations.

History

Since 1996, Dr. Irene Adyatmaka has worked in school oral health settings, managing more than 50 government and private schools. Fortunately she experienced many aspects of school oral health settings, because she worked in these services in private school foundations, in government health centers, and with those managed individually with specific purposes through the R&D Ministry of Health.



Figure 1. School oral health service in Government health center, working together with a dental nurse.

In 2006, after 10 years of working daily in schools and not experiencing any major improvement in children’s oral health, she decided to study again at the Faculty of Dentistry, with this question in mind: what more could be done? She attained a PhD in community dental public health to better understand how to manage the situation.

In 2008, Adyatmaka completed her doctoral dissertation on “Irene Donut - Caries Risk Assessment Computer Program for Pre-school Children,” involving 2,656 pre-school children. This program later became the spearhead of Dental Immunization. The dissertation was completed in 22 months *cum laude* and Adyatmaka was awarded a prestigious entry in the MURI (Indonesian World Records Museum) as the fastest PhD student in

Indonesia. She was also awarded as the Best PhD Graduate by Universitas Indonesia.

In 2009, the Innovative School Oral Health Services program (now called Dental Immunization) was introduced to the Ministry of National Education; and Vice Minister of Education, Professor Fasli Jalal, encouraged the dissemination of this program nationwide in Indonesia. Using a matching grant from the Science, Technology and Arts for the Community Program, the Dental Immunization program was first introduced in dental nurse school at Semarang. The grant process was challenging because the Ministry of Education will only award such a grant if there is a matching amount from a third party. So, the ability to advocate began from here.

In 2010, the Ministry of National Education gave a regional grant to disseminate the Dental Immunization program for three consecutive years in three provinces: West Sumatra (Bukittinggi), East Nusa Tenggara (Kupang), and West Kalimantan. A matching grant needed to be provided by a third party in order to receive the regional grant. Because not all districts had computers, a manual version of the “Irene Donut” program was created.

In 2011, there was a request for the Dental Immunization program training in Tarakan. The head of the city health district decided to adopt the program to complement the Minimum Standard Service. In the past, the activity included only teeth screening and referral on demand for all elementary students. But now, after introduction of the Dental Immunization program, screening is followed by permanent teeth surface protection in all grade 1 elementary schools in Tarakan.

In 2012, Ministry of Health adopted the Dental Immunization program as policy in the Guideline of School Dental Health Services, specifically in Chapter V: Dental Immunization program.



Figure 2. MOH’s guideline of School Dental Health Services – 2012.
Specifically in Chapter V: Dental Immunization program.

A test run was conducted in Denpasar, Bali, during “The 7th Asian Conference of Oral Health Promotion for School Children” in 2012. At this conference, the Innovative School Oral Health program was officially named Dental Immunization as a symbol that all stakeholders have ownership in the program. The “Irene Donut” Dental Immunization program then became known internationally. But even though it was part of national policy, it was not funded by the Government. As part of decentralization, each region is responsible for its own budgeting, dealing with the fact that oral health was never a priority.

The new approach was introduced, not to wait for government funds, but to move the community to claim ownership of their own health and fund the program themselves. An animated version of “Irene Donut” was then launched. Also in 2012, another 13 cities independently requested training to conduct the Dental Immunization program.

In 2013, Dental Immunization was presented at the World Public Health Association during the American Public Health Association Meeting in Boston, Massachusetts, USA.

In 2014, Dental Immunization was presented at the Senior Dental Leaders (SDL-8) event in London, United Kingdom, by invitation from Professor

Bruce Donoff, Dean of the Harvard School of Dental Medicine.

In 2015, Dental Immunization was also discussed at the Senior Dental Leaders (SDL-9) program in Boston and in postgraduate classes at the Harvard School of Dental Medicine. The feedback concerned the need to have a manual or book in English.

In 2016, an English manual for Dental Immunization was created. A short presentation on the development of Dental Immunization was delivered during the Senior Dental Leaders (SDL-10) event in London, UK, capturing the attention of Dr. Summerhays, President of the American Dental Association (ADA). In Indonesia, the program has now become Ministry of Health Regulation (Permenkes no 89/ 2015).



Figure 3. Minister of Health Regulation # 89 / 2015 which includes Dental Immunization approach (known as Innovative School Oral Health).

What has changed?

Below is a table of principal differences between conventional School Oral Health Services (SOHS) and Dental Immunization:

Table 1. The principal differences between conventional School Oral Health Services (SOHS) and Dental Immunization.

Differences	Conventional School Oral Health Services	Dental Immunization
Approach	Curative (screening is conducted; when caries is found, the patient is referred to a health center). The percentage of patients who actually attend a health center after referral is less than 10%.	Preventive (three fences of caries prevention, namely examination of caries risk factors, remineralization therapy to cure white spot lesions and surface protection). These activities can be conducted in schools, in dental clinics, health centers, and other community-based centers (early childhood education centers, pregnant mothers' clinic, kindergarten, center for special needs children).
Dental health education	Mass approach, same message to everyone. Advice given in directive ways.	Personalized (different messages depend on personal risk factor). Parents and children receive personalized feedback of oral health condition, have set of advice menu to choose which behavior they are able to change, they take responsibility for changes, demonstrated self-efficacy, empathy, get daily checklist of what has been agreed to do.
Teeth brushing activity	Mass approach, without mirror and disclosing.	Using three colors disclosing gel and mirror. Children improve their skills.

Differences	Conventional School Oral Health Services	Dental Immunization
Target	Elementary school students, preferably of higher grade (grades four, five and six), because the students are easier to organize.	Early childhood children, child education institutions, kindergarten, pregnant mothers in health centers, child patients in dental clinics, special needs children, elementary school children.
Specific target	Filling tooth decay, extraction of permanent teeth with gangrene.	Caries risk assessment, Fluoride + CPP-ACP varnish, surface protection of erupting first and second permanent molar teeth.
Engagement & empowerment	It does not involve parents and school. Health personnel only.	Patients, parents and community centers.
Health personnel acceptance	Health personnel are bored with the School Oral Health Service routines.	Health personnel get new skills and new preventive menu.
Ownership	School communities feel that the School Oral Health Service disturbs school schedule. They do not understand what health personnel do, therefore they do not appreciate the presence of the School Oral Health Service.	Parents / community become leaders and agents of change.
Funds	Only waiting from government funding. "No government budget, no activity." The engine is funding.	Funding comes from parents / patients/ schools.
Survey / screening	Record only decayed, missing or filled teeth.	Record white spot lesions, black fissures (for preventive action purposes), decayed, missing, filled teeth.

UNDERSTANDING THE CHALLENGES

Persistent Caries Problem

I was freshly graduated from Faculty of Dentistry and had joined a school oral health service in 1996, when a father came with his 5-year-old daughter. The father asked me, “Doc, please check my daughter’s condition. What should I do with it?” He then asked the daughter to open her mouth.

And this was what I saw.



Figure 4. At least 10 children every day were suffering with decays like this.

Frustrated, I answered spontaneously, “Well, this is already very late stage. There is nothing we can do here except pray.” We both looked sad and kept silent. I then made a referral letter for him to take the daughter to a pedodontist.

It turned out to be a shocking trigger event for me when I realized as a dentist I could not do anything with a case like that. And for me it seemed quite absurd when I knew the teeth were all gone, but I still confidently sang our song, “You should brush your teeth twice a day, eat vegetables, do not eat candies, etc.” Was that all I could do as dentist, blame the patient? They were already very sad. I considered that it was not their fault if they did not know how to prevent this, because I did not teach them in the beginning.

These shocking events continued, as for the period of 10 years, I saw at

least 10 children every day who were suffering with similar decay.

Indonesia National Basic Health Research 2007 showed the composition of active caries prevalence as: 46.7% need *treatment*, 23.2% *potential demand*, and 6.9% *effective medical demand*, showing a great gap that needed attention.

The carious dental condition of children aged five to six years old was even worse. WHO had targeted in HFA 2000 (Health for All by the Year 2000) that the caries-free percentage must be greater than 50%. However, observations conducted in several sites in Indonesia showed that the percentage of caries-free children was only between 3% and 10%. It was also recorded that 60% of children have more than seven carious primary teeth, while 25% already have carious lesions on permanent teeth.

Dental caries in children truly demands attention because it disrupts the chewing process and delays the child's growth, especially of brain development.

One of the positive actions taken for first grade elementary school students is screening to check their dental condition. Unfortunately, there was no real action taken to address the issues revealed by the examination. We spent the whole year just to screen, wasting our time and the students' time, until one day, the school did not feel that we were useful anymore. We came to a stage where the schools in some places did not want our presence anymore because we took study time to do our activities: screening, tooth brushing, and dental health education. "What's in it for me" from the school's and students' perspective? "Nothing."

No wonder, when oral health personnel came to the school, many times we heard excuses:

"Sorry, our schedule is full."

"Sorry, we have exams today."

"Sorry, schools are busy this month."

"Sorry, today is a mathematics lecture" (meaning your dental health

education is less important).

“Sorry, can you speed up your talk in the class? We are about to start with another topic.”

When you came to the school, they did not even bother where, when, how, why you worked.

Are you familiar with those sayings? You are not alone.

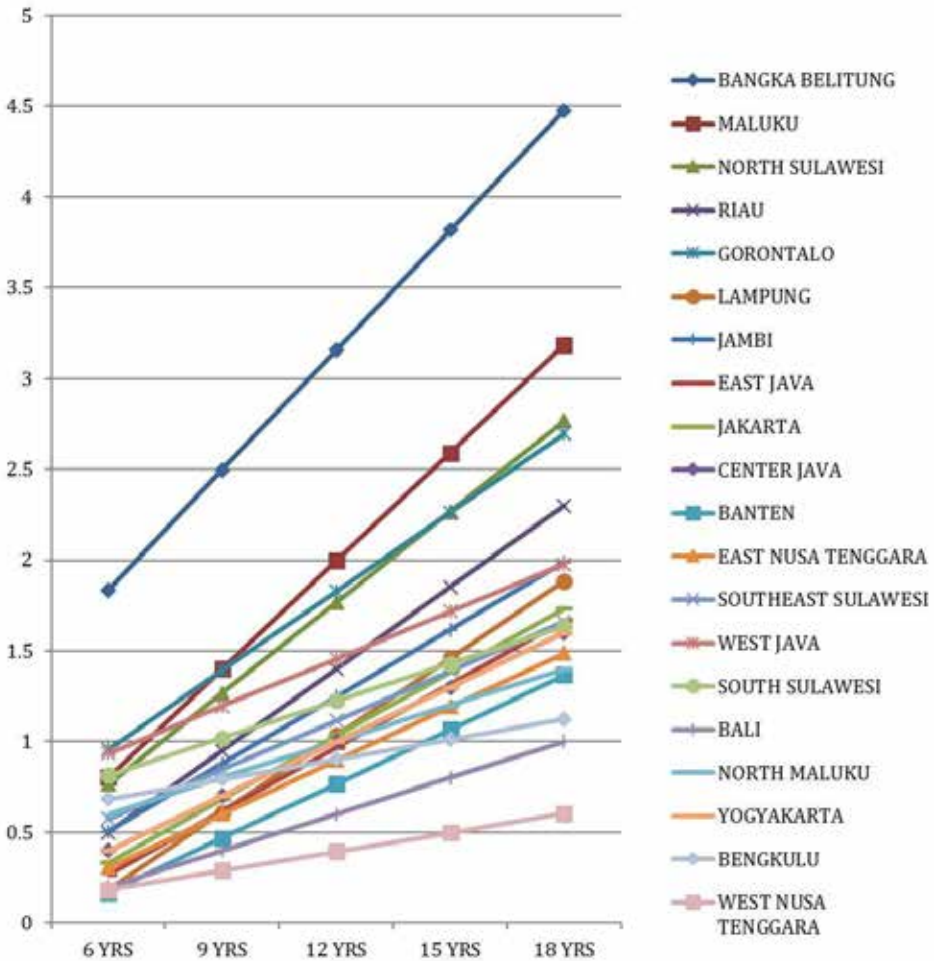
Not all SOHS programs are run effectively. There are even schools refusing the SOHS program since they believed it would disturb the school's schedule and its benefit was in doubt. The school community does not have a sense of ownership towards the SOHS program and they even feel burdened by it

Trend of Caries in Permanent Teeth by Province

We used to do a mass approach for everybody everywhere: same topic in dental health education year after year, same tooth brushing activities.

But, interestingly, when we analyzed Indonesia National Health Research data, we found contradictory facts.

The simulation analysis using Basic Health Research data 2007 was used to predict the situation of carious lesions in permanent teeth in children aged six years in Indonesia. The results show that every province had a different critical trend. The children in Bangka were predicted to have carious lesions in two permanent teeth at the age of six with a high incidence trend. On the contrary, the children in West Nusa Tenggara were predicted to have carious lesions, on average, in 0.5 permanent teeth per child with a low incidence trend. This shows each province had a different combination of factors triggering dental caries.



Graphic 1: Expected caries experience (DMFT INDEX) at age 6, 9, 12, 15, and 18 after regression analysis was conducted on BHR data 2007 (Irene Adyatmaka, Adang Bachtiar, Amila Megraini).

So, if we keep doing the same thing, for example dental health education once a month and tooth brushing once a week, in Bangka and in West Nusa Tenggara, would it give same result in each location? Of course not.

Thus, a generalized approach is no longer effective. An innovation is necessary to individualize care and solve different problems in different places with a different trend.

Dental Caries Pathogenesis Spectrum

The pathogenesis spectrum of dental caries illustrates its development. The earliest stage of caries is called the “Vulnerable Stage.” If no treatment is provided, the tooth will eventually enter the early stage of caries, which is decaying tooth enamel (Stage d1). If still untreated the caries will damage the dentin, called “Stage d2.” At this stage pain occurs when the tooth receives stimulation from outside. If this condition remains the caries will attack the pulp and spontaneous pain will occur, called “Stage d3.” If the condition remains, the tooth may be fractured or even cause an abscess or a fistula. This stage is called the “Advanced Stage.”

Why is it important to understand the caries pathogenesis spectrum?

By observing the pattern, one can analyze the level of severity of the disease (the peak of the curve), the malignancy trend of dental caries (trend line) in that certain group, and the time when the countermeasure treatment should be applied. If caries is treated immediately, the next “stage” can be stopped.

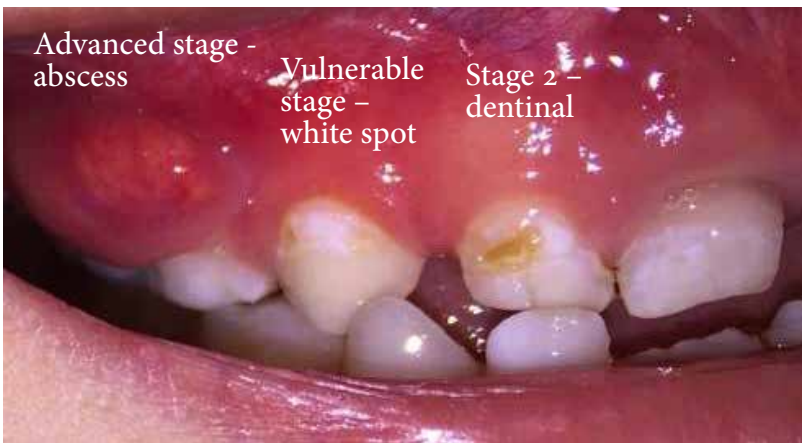
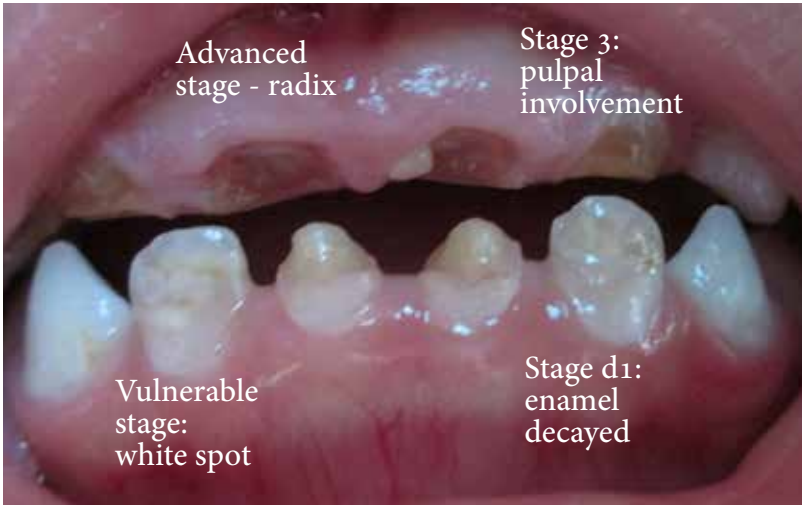
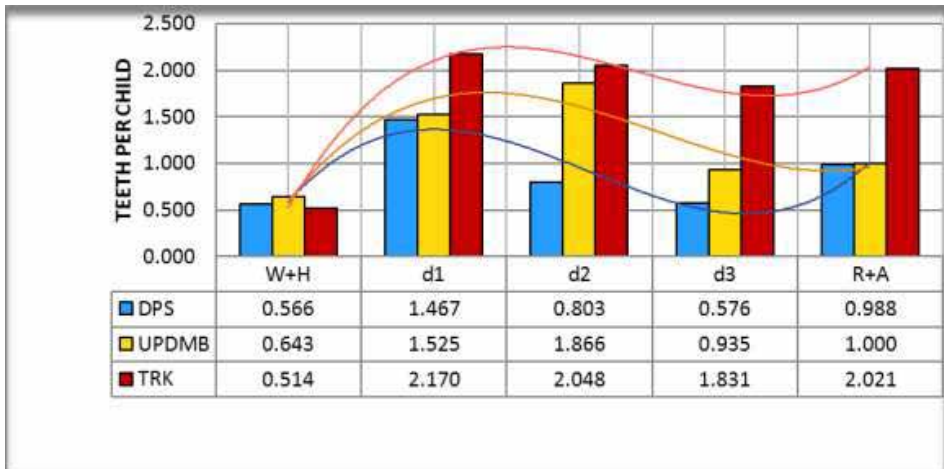


Figure 5 and Figure 6. Caries pathogenesis spectrum in child's mouth.

Caries Pathogenesis Spectrum in Deciduous Teeth

Pathogenesis Spectrum analysis in deciduous dental caries was conducted by Dr. Andreas Adyatmaka. Samples were collected from first grade students in three locations: Tarakan (TRK), Kalimantan (3077 subjects), University of Professor Dr. Moestopo (UPDMB), Jakarta, Java (417 subjects), and Denpasar (DPS), Bali (488 subjects).

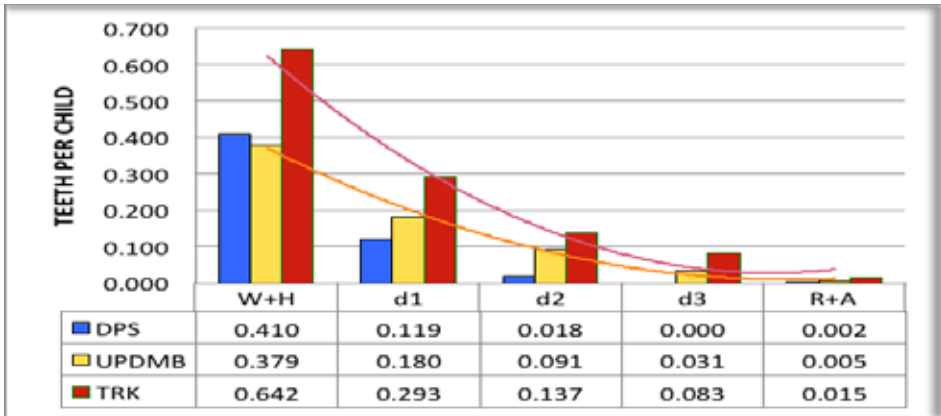
The severity rate in Tarakan is the highest, while in Bali it is the lowest. By studying the development of caries from “Vulnerable Stage” (h+w = black fissure and white spot) to “Advanced Stage” (r + a = radix and abscess) in those groups, we can see that people tend to let deciduous dental caries proceed without intervention. In Tarakan, for example, there are 217 cases of enamel caries and 202 cases of radix/abscess per 100 children. In Denpasar, although the condition is better, there are still 146 enamel caries, and 98 radix/abscess per 100 children. This finding suggest that d1 can be stopped by immediate treatment so the caries process does not progress to d2 and next stages.



Graphic 2. Caries pathogenesis spectrum of deciduous teeth of the children in Tarakan, Jakarta (UPDMB) and Denpasar.

Caries Pathogenesis Spectrum in Permanent Teeth

On the contrary, the graphic of pathogenesis spectrum in permanent teeth caries tends to decline. This indicates that new caries processes have just started. The “Vulnerable Stage,” in which the symptoms are white sp ot lesions and black fissures, remains high. The next “Stage” is lower.



Graphic 3. Caries pathogenesis spectrum of permanent teeth of the children in Tarakan, Jakarta (UPDMB) and Denpasar.

In Denpasar, there are 41 teeth per 100 children in the “Vulnerable Stage.” At this stage, IF, these children receive an intervention (remineralization therapy), “Stage d1” and the following stages will be prevented. And in the same thinking process, if at “Stage d1” decay can be stopped with fissure protection treatment or ART (Atraumatic Restorative Treatment), we will reduce the risk of 119 permanent teeth becoming dentinal decays.

Life Lessons

Dental caries in children demands attention because it disrupts the chewing process and delays the child's growth, especially of brain development

School is the easiest way to reach these children.

The problem is that not all school oral health service (SOHS) programs are run effectively. There are even schools refusing the SOHS program since they believe it would disturb the school's schedule and its benefit is in doubt.

The school community does not have a sense of ownership towards the SOHS program and they even feel burdened by it.

A generalized approach is no longer effective.

If caries is treated immediately, the next "stage" can be prevented. But if we let it progress to an advanced stage, as dentists, we face difficulties and limitations in giving appropriate treatment.

To prevent is simpler to manage than to cure.

What we want to do is create a leapfrog innovation to individualize care and solve different problems in different places with a different trend.

MASTERING THE DENTAL IMMUNIZATION CONCEPTS

Dental Immunization

Understanding the challenges, rather than waiting for a tooth to become decayed and then approaching it curatively, it is better to do preventive steps.

Dental Immunization is an innovative oral health program, consisting of three preventive fences (Irene Donut caries risk simulation, remineralization therapy, and surface protection) that aim to fortify a person against an agent. The main source that moves this program is empowerment, where everyone has important role.

The components of Dental Immunization can be likened to three fences protecting against dental caries. The first fence is risk assessment using “Irene Donut” in relation to behavior management. The second fence is remineralization therapy, which is applied at home if the first fence fails to protect teeth and there are signs of demineralization. If this also fails, a third fence can be used: that is protecting erupting molars (surface protection) by dental health personnel.

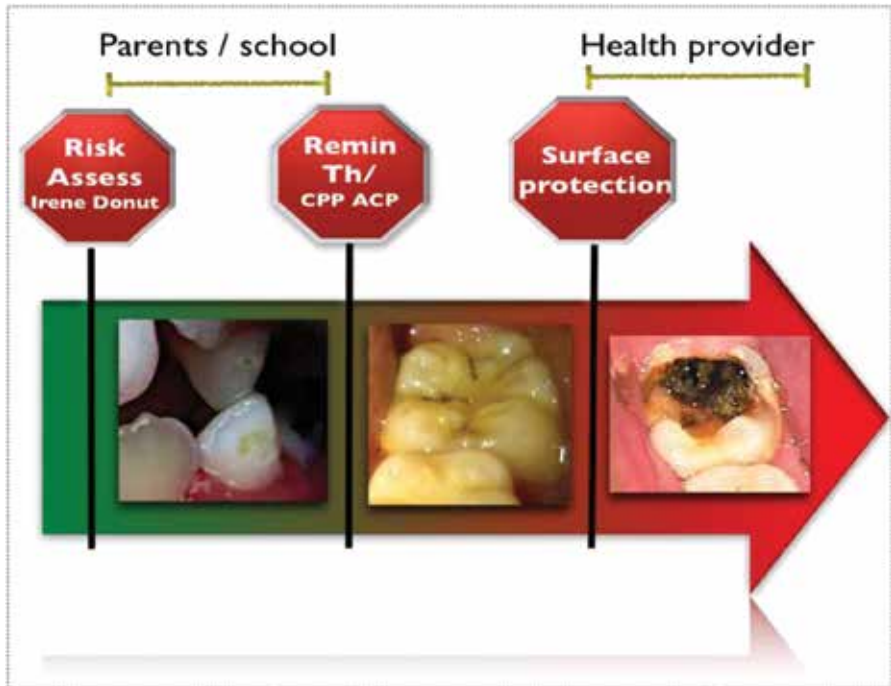


Figure 7. Three fences protecting against dental caries: Irene Donut caries risk simulation, remineralization therapy, and surface protection.

Aside from the three fences, improvement in children’s skill in tooth brushing is also an important component in this program.

1. Simulation of Caries Risk Using “Irene Donut

This is an evidence-based prediction method that empowers patients and conforms to their needs. It allows for individual caries risk management, considering that each patient has different risk factors that need to be handled differently.

2. Remineralization Therapy

From the author's dissertation research, it was found that teeth with white spot lesions and stained fissures have three times the risk of becoming decayed compared to teeth without white spot lesions and black fissures. It is obvious that a treatment for stopping the progression of carious white spots is important. To manage demineralization, GC Tooth Mousse containing Recaldent™ (CPP-ACP) is chosen as a daily supplement prescription to be used at home. Calcium and phosphate complex preparations are used to return missing minerals into teeth before a cavity is created and to help neutralize acidity in the mouth.

3. Erupting Permanent Teeth Protection

To manage high-risk erupting molars and stained-fissured molars, a procedure to accelerate the maturation of enamel structure of erupting teeth before caries attack is preferred. The procedure only takes three minutes with an affordable cost and is called surface protection.

4. Tooth Brushing Skill Improvement

This is a tooth brushing exercise that focuses on skill improvement. GC Tri Plaque ID Gel™ is used before the exercise. Pink plaque is recently formed plaque. Purple plaque indicates mature plaque that has not been removed in more than 48 hours. Light blue plaque is cariogenic, or acid-producing, plaque (generally that has not been removed in more than five days). Children are taught to know the location of plaque that is difficult to remove just by brushing the teeth daily and to focus on cleaning the area by looking in a mirror. The tooth brushing exercise is conducted in schools on a certain schedule.



Figure 8. Purple plaque indicates mature plaque that has not been removed in more than 48 hours.

This picture was taken after a child has finished brushing his teeth in a mass tooth brushing exercise. To support our assumption that mass tooth brushing is not that efficient, disclosing gel was applied after the tooth brushing activity. If they had brushed correctly, then the teeth should be clean. The disclosing solution showed several regions where plaque was not removed thoroughly. This proves that the regularly conducted mass tooth brushing exercise is not effective for some children as it does not help them increase their skill.



Figure 9. Using a simple mirror and a three-color disclosing gel such as

MASTERING THE DENTAL IMMUNIZATION COMPONENTS

Caries Risk Simulator Irene Donut

One day in my practice, a mother and her 3-year-old daughter who had severe caries came in. This was our conversation:

Patient : “Doc, what is the cause factor of these decays?”

Me : “Oh, most probably because patient does not brush well enough.”

Patient : “No, I myself brush her teeth 3 times a day.”

Me : “Maybe she still drinks milk using a bottle and falls asleep with the bottle’s nipple still inside her mouth?”

Patient : “No, she never used bottle when drinking milk. I spoon fed her.”

Me : “Ah, maybe she likes to eat candies?”

Patient : “No, I never allowed her to eat candies.”

Sound familiar to you? It is never easy to correctly “guess” what would be the caries risk factor of each patient. And as long as we do not know what the risk factor is, how can we advise the correct preventive strategies for that particular patient?

There are several caries risk assessment tools nowadays. The problems with these tools include: some of them need a bacterial lab count, which is costly and time consuming; they are not specifically designed for children (while children have higher caries risk and need a different approach); the patient is not provided clear direction on “what’s next,” and even if there is a strategy, it is usually given in a “directive” manner.

You cannot move people using the directive approach. How many advertisements do not really stop people from smoking? Why does health education fail? Because we tend to give only advice.

People need feedback on where they are, at the moment, to move them. If someone tells you to change your dress, you would not until you were told that it was torn at the back. That is how feedback works. It shows something that is harmful.

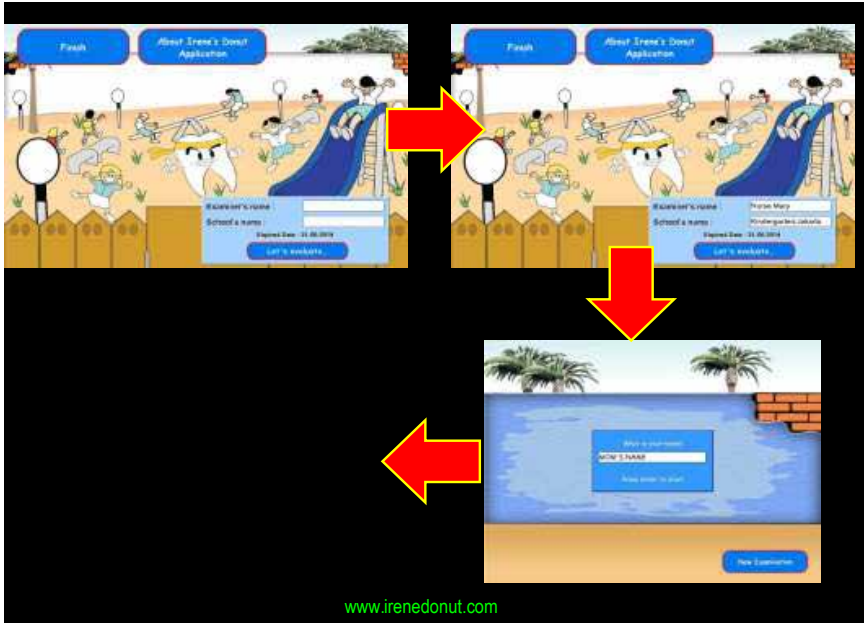


Figure 10. Starting to fill in the caries risk simulator Irene Donut. The sequence to fill targets identity and provider.

“Irene Donut” is an evidence-based risk assessment method for carious teeth. It is based on the doctoral dissertation of the author, involving 2,656 children aged five to seven years old and their parents as research subjects. Out of 50 risk factors searched from international journals, and after running several series of logistic regression analysis, there are 15 risk factors found to be significant for caries in children. This software can be freely downloaded from www.iredonut.com. It is also available in phone apps for Android and iPhone. A fun software, it is an interactive means for assessing risk factors personally, with or without the help of dental health personnel.

Before using the software, an examination of dental plaque pH should be conducted. But if pH plaque is not available, this step can be skipped and the patient can simply choose the option: acid pH. Based on the author’s dissertation, 95% of the children had acid plaque. This examination takes

five minutes to complete. While waiting for the results, parents and their children can begin to answer questions.

How it works is simple. We enter all data and answer all questions. After all the questions have been answered, a donut diagram appears on the screen. The more red it is, the more severe the risk. For example, it will tell you, if the child continues his current behavior, the risk of new decay is 99.9%. It gives you feedback right away.

One day when I presented Caries Risk assessment Irene Donut to officials from Ministry of Health, one of them said, “Can you please make a risk assessment for smokers? Maybe if they get feedback on how much percentage risk of dying if they keep smoking that much, they will stop.”

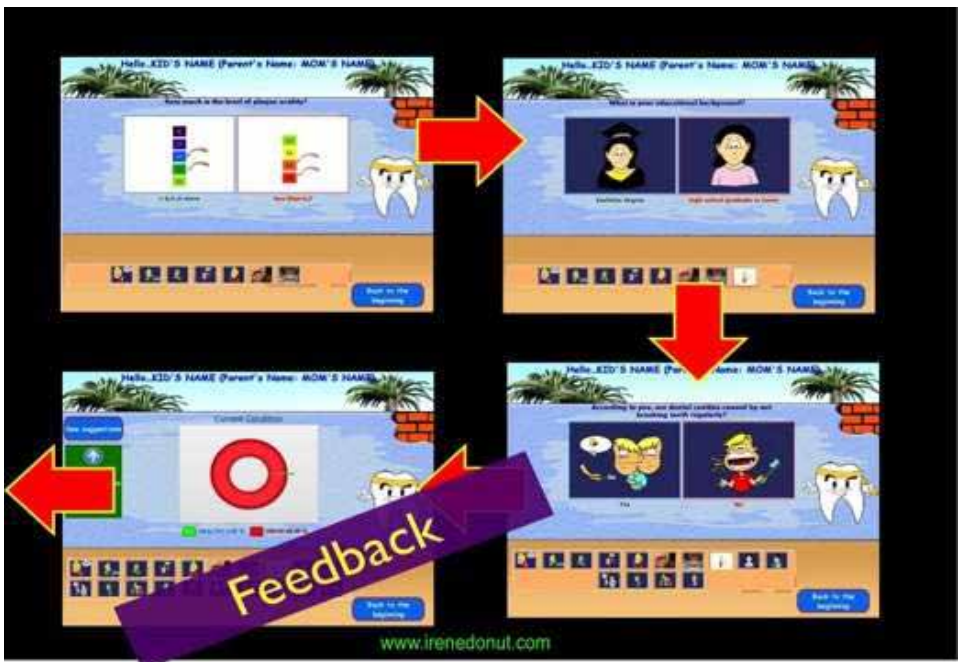


Figure 11. The sequence of caries risk simulator Irene Donut: interactive process to push the need for parent’s feedback.

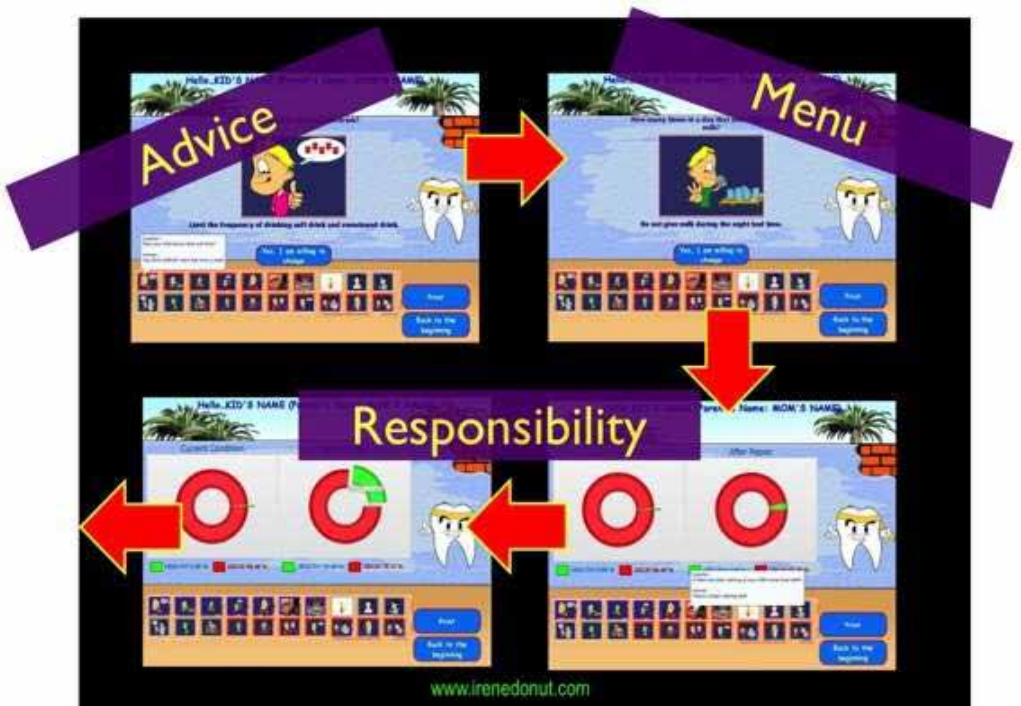


Figure 12. The sequence of caries risk simulator Irene Donut: interactive process to elaborate advice, to propose menu, to assign responsibility.

After the patient gets the feedback, and she needs advice to lower the risk, we can proceed to the advice. The amazing thing about the software is that it gives the patient the freedom to choose which advice she is capable of. It gives the patient a menu to select from. The patients, depending on their ability and willingness, decide which risk factors are going to be reduced and the corrected caries risk is generated.

When the patient selects a particular advice, she takes full responsibility to do it. This way, the success is more predictable because the will comes from the patient herself.

Every time the patient chooses to change bad behaviors, the green portion of donut diagram will grow bigger. Patient can simulate which behavior would effect the most reduction and how it affects the caries risk percentage overall.

To make sure that patient brings back commitment and does it regularly at home, she can print a “tooth rapport” which contains a checklist for daily monitoring.



Figure 13. The sequence of caries risk simulator Iren Donut: interactive process to give empathy and build parent’s self-efficacy.



Figure 14. An excited child with her mother, accompanied by a dentist, are checking her caries risk using Irene Donut software, at SD Saraswati 5, Denpasar.



Figure 15. A student of SD Saraswati 5, Denpasar is demonstrating the Irene Donut to a foreign guest.

Benefits of Irene Donut Software

1. To give feedback concerning caries risk factors in children.
2. To give an understanding on how to handle caries risk factors.
3. To visualize the severity level of each risk factor.
4. To empower parents to control the dental health of their children.



Figure 16. Teaching parents how to recognize white spots in child's teeth

Manual Version of Irene Donut

When I first introduced Irene Donut software to a remote area in Kalimantan, the headmaster said to me, “Dr. Irene, we do not have a computer here.” I was guessing her next statement would be either, “I cannot apply your program here” or “Please buy me a computer.” But I was wrong. Her next statement was, “Could you please make us an Irene Donut flipchart so I can teach my students and their parents?”

Undoubtedly, the Irene Donut approach gives different perspectives on how a community perceives oral health. If previously they thought oral health was not their responsibility, now they want to be useful and take part in this mission.



Figure 17. A headmaster of kindergarten school Nurul Muslimin in Kubu raya Kalimantan, Mrs. Suryati, is lecturing on Irene Donut to all the parents.

So thanks to Mrs. Suryati's brilliant idea, now Irene Donut is available in manual format.

It is an assessment method of caries risk simulation conducted manually, by way of counting every risk factor by making notes on a paper. There are 15 questions and each question is given a numerical value. The manual version of this method can be used for an assessment conducted by 30 to 40 parents. Guided by an oral health educator, parents enter numbers according to risk factors being identified, then the numbers are added up and conformed to the percentage of caries risk stated in the list. The parents are then given a check list of recommendations for handling each risk factor and bad habit listed in the menu of desired changes.

In the interest of community health, Irene Donut can identify risk factors in a group of the population. The result can be used to compile dental health counseling materials suitable for that population group. In other words, the characteristics of the counseling materials are customized to match

the condition of the population, in order for the population to properly internalize it.

Irene Donut has two versions: computer software and manual (book/flipchart). The computer program assesses carries risk individually (one person at one time), while the manual version can be used for both individuals and groups (assessing multiple numbers of people at one time).

Every person or group has different combinations of risk factors; thus, appropriate preventive measures should be made which are applicable to that person or group.

Irene Donut Usage

When I was teaching at the University, one day, my students came back from the school after conducting school oral health service. When I asked them how their first day went, they complained, “When we arrived in the school, some students were asking, ‘Why are you here?’ And when we answered, ‘We will lecture about oral health education,’ the students yelled, ‘Again??’”

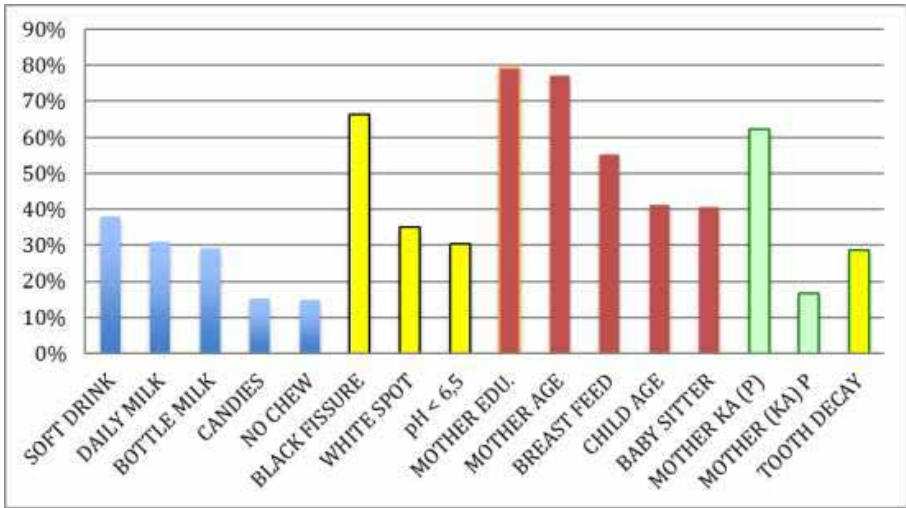
After we finished laughing at their story, I said to them, “It is a very good eye-opening experience, though. Have we realized that we are so boring? We use the same education material, on and on, same topic, and have made the children so bored and frustrated to see us.”

I had an idea, to go back again to the school and this time do Irene Donut assessment. From the assessment, we can then see what the major risk factor is in the class and make specific oral health education about that risk.

Here is the result.

Study on Irene Donut in Four Elementary Schools/Kindergartens with 533 Parents as Respondents

Results of the study of Irene Donut with 533 parents are as follows:



Graphic 4. Distribution of Risk Factors in Kindergarten/1st Grade – 2nd Grade Elementary School Children in 4 Schools in Denpasar Bali – 2012.

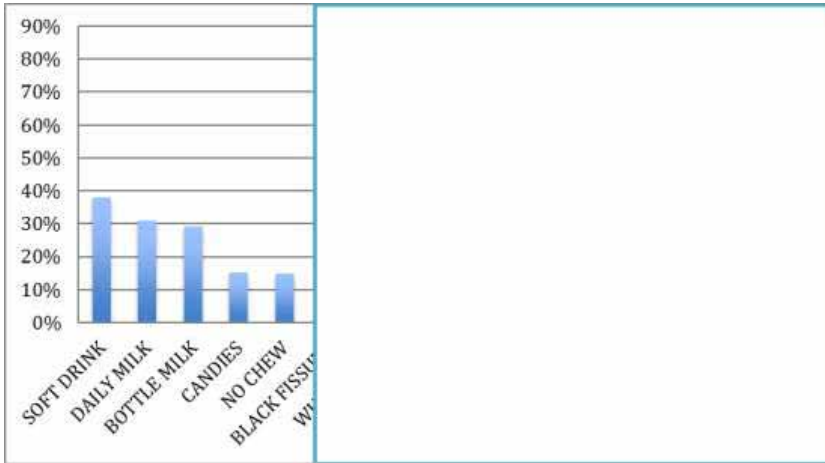
Blue bars represent children’s risky behavior; this factor can be changed.

Yellow bars represent children’s oral condition; this factor can be anticipated.

Brown bars represent risky predispositions that cannot be changed but can be anticipated.

Green bars represent the mother’s risky attitude and behavior that can be changed.

Let’s focus first on the blue bars: child behavior.



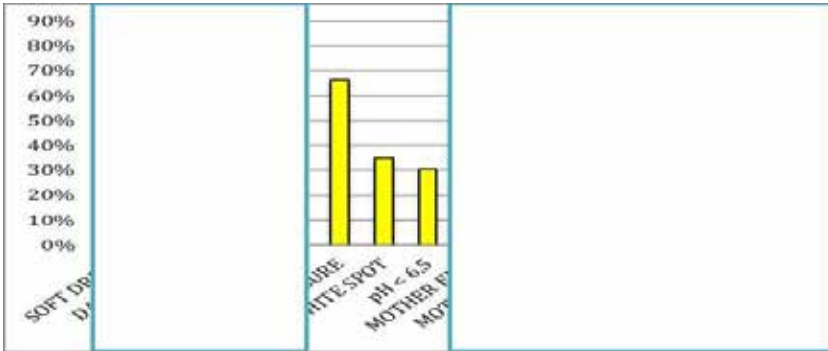
Graphic 5. Blue bar section: child behavior.

It is clearly seen in this graph that drinking soft drink is the major problem in these group of school children. Therefore let’s make education material specifically about soft drink. And let’s see the difference in students’ acceptance.

The below picture shows how children became more interested since the topic is about soft drink - “about them.”



Figure 18. Children became interested when the topic was about them.



Graphic 6. Yellow bar section: child oral condition.

Now, we focus on the yellow bar: The condition in the mouth.

When we are going to alleviate community health problems, black stains on teeth (66%) shall be anticipated by surface protection.

Moreover, all unfavorable predispositions should be anticipated and parents should pay more attention to their children’s dental health as well as assist/supervise their children when brushing their teeth every night before sleep. Mothers’ behavior may be changed using “motivational interviewing Irene Donut.”

Regarding changing behavior, here are inspiring stories from the empowered community.



Figure 19. Inspiring stories from the empowered community.

After one month of parents' implementing the checklist, we met again. During that meeting, one mother raised her issue, "I still cannot persuade my child not to drink milk in the bottle during the night. What can I do?" Surprisingly, another mother raised her hand," Dr. Irene, may I share what I did? Yes, I found the same difficulties. But now after I understand the bad effect of drinking bottled milk at night, I tried to stop it. So, now when my son asks for bottled milk, I give him the bottle but I filled it with water. Of course, when my son tastes it, he screams that it's horrible. So I told him, 'Yes, that is how milk tastes during night. It is better to drink milk before you go to bed.' And since then, he's never asked for milk during night."

It's amazing to see how parents became empowered and they empowered each other.

The headmaster of the school, Mrs. Suryati, realized that many students still come to the school carrying bottled milk. Understanding that it is quite a challenge for parents to take the bottle, she came up with a unique event, "Bottle Milk Graduation."



Figure 20. "Bottle Milk Graduation" symbolizes that now you are not "babies" anymore.

So, each child would bring their bottle milk, and during the “graduation” event, they surrender their bottle, and the teacher will give them a glass wrapped in a gift box in return. Amazingly successful story of how to get rid of those bottles in a quick way without any hesitation from the children.

Never underestimate what a community can do when it is empowered.

Parents’ Acceptance Regarding Irene Donut Caries Risk Simulator

Table 2 Parents acceptance regarding Irene donut caries risk simulator

Utility rate (very useful/useful)	Function (for understanding risk and its prevention)	Comprehension (understandable, but better to have explanation before)	Applicable advice	Attractive Design
96%	96%	96%	80%	80%

Source: Questionnaire result on caries risk simulator Irene Donut- report of dr Adang bachtiar, mph, scd. center for health administration and policy studies university of indonesia 2009

Table 2. Parents’ acceptance regarding Irene Donut caries risk simulator

Operators’ Perceptions (Dentists vs School Oral Health Worker vs Dental Nurse)

The understanding of students from Dental Nurse School before and after caries risks simulation practice as compared with the understanding of dentists and SOHS workers are as follows:

Table 3. Response on software performance by health workers

Oral health workers Soft ware performance		Dentists in the private clinic, after hearing the theory	School oral health worker after hearing the theory	Dental nurse students after hearing the theory	Dental nurse students after hearing the theory and practice it
		YES	YES	YES	YES
1a E	asy to understand	97%	90%	89%	100%
1b H	aving good systematics	96%	95%	87%	92%
1c E	asy to operate	76%	95%	95%	100%
1d	Health advice is easy to be understood by patients	91%	65%	87%	96%
1e	Checklist can be done by patients	97%	40%	89%	88%

In summary, the program is easy to understand (94%), systematic (92%), easy to operate (91%): all respondents are optimistic about this.

But, on whether patients will follow and fill in the checklist, school oral health workers were pessimistic. It is understandable, remembering that with previous experience working in conventional school oral health, there has never been such empowerment. Lesson learned: when we are dealing with school oral health workers, we need extra effort to motivate and assure them that they can do it and community can be empowered.

Table 4. Response on the ability of the software in helping patient

2	The software helps patient in maintaining dental health.	Dentist	SOHS	DNS 1	DNS 2
	Very helpful/ helpful	92.80%	65.00%	91.8%	100%

All responded optimistically, except school oral health workers. Again, this is because in their past experience there has never been parent empowerment.

Table 5. Response on the benefit of the software concerning the relationship between caregiver and recipient

		Dentist	SOHS	DNS 1	DNS 2
3a	Improving the relationship	97.10%	70.00%	89.2%	100%
3b	Increasing the trust to doctor	91.40%	75.00%	78.4%	96%
3c	Increasing the loyalty to doctor	87.10%	50.00%	83.8%	96%

All responded positively except school oral health workers. They are not sure whether this program can increase the loyalty to doctors.

Table 6. Interest to use the software.

		Dentist	SOHS	DNS 1	DNS 2
4	Interested	85.70%	70.00%	67.6%	83%

Again, school oral health workers were the most pessimistic. Dental nurse students were able to increase their interest after practicing, from 67.7% to 83%.

Table 7. Tolerable time duration.

5	Time Duration	Dentist	SOHS	DNS 1	DNS 2
5a	<5mnt	17.10%	35.00%	13.5%	8%
5b	5-10 mnt	48.60%	35.00%	41%	46%
5c	>10 mnt	24.30%	5.00%	16%	33%

In summary, the convenient and tolerable time to do the software was 5-10 minutes. After practicing, dental nurse students increased their tolerable time to more than 10 minutes (33%).

Table 8. Ability as software operator.

6	Worker	Dentist	SOHS	DNS 1	DNS 2
	Dentist	47%	30%	10,8%	0%
	Dental nurse	17%	0%	45,9%	58%
	patient	16%	5%	13,5%	8%
	Dentist and dental nurse	9%	20%	5,4%	17%
	Abstain	12%	45%	24%	17%
	TOTAL	100%	100%	100%	100%

Dentists who work in private practice were confident that the dentist alone can do the software (47%).

School oral health workers tend to work in the field always with a dental nurse, so 20% choose to work together with dental nurse. They did not think that a dental nurse is capable of using the software.

On the other hand, dental nurse students, after receiving practice, think that the software did not need to be run by dentist (0%). Dental nurses were confident doing it alone (58%) or with a dentist (17%), for a total of 75%.

In conclusion, there is an increase in understanding after dental nurse students practice Irene Donut software. The number of dental nurse students who think the software is easy to operate increased from 82% to 100%. Their ability to operate the software also increased from 0% to 46% after receiving the theory, and to 58% after practice. The problem is their ability to explain the software to parents and promote the program to schools. Therefore, they wish to be still coordinated by dental nurse school.

During all my travels to many places, the most difficult people to convince at the start is not the school, the parents, nor the teachers, but the school oral health workers.

Here is an example of how our school oral health workers tend to be more pessimistic, absolutely because of their past experiences in managing school oral health service.

Table 9. Ability of software to help patients in maintaining dental health and the obedience to the checklist.

	Parents' agreement	School oral health workers' agreement
The software helps patient in maintaining dental health.	96%	65%
Checklist can be done by patients	80%	40%

But on the other side, remember that parents and schools need us and they react positively towards the program.

Most of the time, after school oral health workers receive complete training on Dental Immunization, within 5 days, they can already see things differently. Here they are, now very energized, positive, proud of their role, and empowered.



Figure 21. Amazing team from Bontang, Kalimantan.

Change the way we approach things, and we will get different results.

Remineralization Therapy

Demineralization of tooth structure can be easily explained using the pictures below.

Analogy of demineralization:

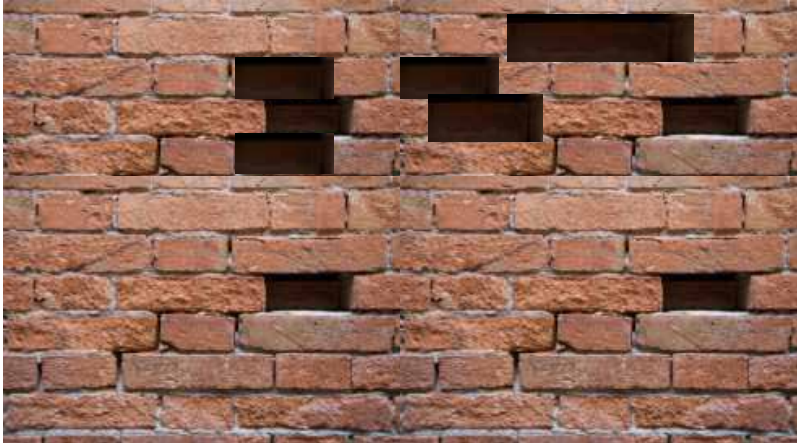


Figure 22. Analogy of demineralization, loss of some bricks.

To avoid the wall collapsing, we must immediately return the missing bricks. That is the remineralization concept.



Figure 23. Severe demineralization, loss and destruction of enamel and dentin. Photograph by Dr. Wilya Elawitachya..

The demineralization process of tooth structure can be seen clinically with the presence of white spots on the teeth. Like the building with the missing bricks, sustained demineralization without intervention will collapse the “wall” of the tooth, which creates a tooth cavity.

Remineralization therapy involves the daily administration of calcium and phosphate ions (using CPP-ACP preparations) and fluoride for children whose teeth have been exposed to the demineralization process. Demineralization may happen due to teeth being frequently exposed to low pH plaque for a long period of time. The preparation being used in this case is GC Tooth Mousse containing Recaldent™ CPP-ACP (Casein Phosphopeptide Amorphous Calcium Phosphate).

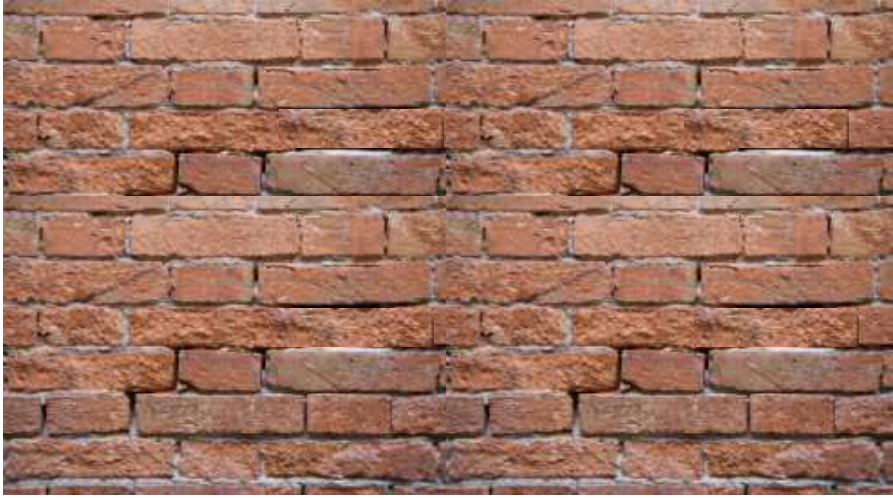


Figure 24. Analogy of remineralization, restoring the missing bricks.

Benefits of Remineralization Therapy

1. To prevent tooth damage by returning calcium and phosphate ions to the teeth.
2. To maintain oral pH balance.
3. To arrest and heal the early process of dental caries.
4. To empower and build the responsibility of the parents.

Application Procedure of Remineralization Therapy

1. Conduct simulation of caries risk assessment with Irene Donut.
2. For those with high caries risk, such as poor diet, low pH plaque, and high-risk behavior, the Irene Donut program would recommend CPP-ACP application. Sufficient explanation should be given and mineralization cream should be administered to replace lost minerals due to demineralization.
3. Educate parents to apply a small amount of GC Tooth Mousse using a finger or cotton bud on the surface of front teeth.

4. Evenly spread the GC Tooth Mousse on the entire surface of the front teeth inside the month with the tongue.
5. Instruct patient not to eat, drink, or gargle for at least 30 minutes after the application.
6. Use GC Tooth Mousse a twice a day after brushing the teeth with a fluoridated toothpaste.
7. In the case of rampant caries, GC Tooth Mousse should be given immediately after the teeth have been exposed to foods that may cause acid, such as every time the child drinks milk or juice from a bottle.
8. Considering Recaldent™ CPP-ACP is a derivative from bovine milk protein casein, it is safe if swallowed. Patients with casein allergy and benzoate allergy should not use this.

FDI Statement: Minimal Intervention in the Management of Dental Caries

The FDI General Assembly on October 1, 2002 in Vienna supported the principles of minimal intervention dentistry in the management of dental caries. The third principle states:

“Remineralization of non-cavitated lesions of enamel and dentine:

Saliva plays a critical role in the demineralization remineralization cycle, and its quantity and quality should therefore be assessed. There is strong evidence that white spot lesions of enamel and non-cavitated lesions of dentine can be arrested or reversed. Such lesions should therefore be managed initially by remineralization techniques.”

The Theory Behind Remineralization Therapy

Dental Caries:

Demineralization and Remineralization

Professor David J. Manton

Dental caries is still a major oral disease affecting children, despite the fact that in most cases, it is preventable. The burden of dental caries on the quality of life of children is large, with severe early childhood caries (sECC) increasing the chance of failure to thrive and providing great challenges to the dentist regarding treatment. In the majority of cases, ECC is caused by poor diet high in fermentable carbohydrates, poor oral hygiene, and low exposure to topical fluorides. Occasionally, disruption to saliva quality and quantity, and developmental defects of the teeth increase the risk of dental caries.

Dental Enamel

Dental enamel is the hardest, most wear-resistant material in the body and is significantly more mineralized than dentine or bone. These characteristics allow the efficient mastication of food by teeth covered in a material resistant to wear, fracture, and dissolution in most circumstances. They are also extremely important in an individual's appearance.

Human enamel is composed primarily of impure apatite salts (hydroxyapatite, fluorapatite, and carbonated apatite), water, and organic material. Enamel is arranged in rod-like structures of approximately six microns in diameter starting at the surface and ending at the dento-enamel junction. These rods are composed of strategically arranged apatite crystals, which together provide the resilient physical characteristics of enamel, but also allow diffusion on ions, both in and out.

Dental Caries

Simplistically, dental caries is the result of the net loss of mineral from the tooth. However, in dentistry, the use of the term “dental caries” for both the process of mineral loss and the outcome of this loss (ie, the carious lesion) has confused the issue somewhat. So, it is best to consider the process as one of remineralization and demineralization which occurs cyclically in most individuals depending on their diet, and of the carious lesion as the clinical outcome.

The loss of mineral is due to the acidic by-products (namely lactic acid) of dental biofilm carbohydrate metabolism creating an undersaturated environment with respect to tooth mineral in the fluid at the tooth surface and around the enamel crystals. This undersaturated environment leads to the dissolution of enamel crystals until saturation of the fluid is obtained. This dissolved mineral is then lost from the tooth by diffusion via the inter-rod spaces—demineralization.

Oral Biofilm

The oral biofilm is a complex community of microorganisms influenced by a number of factors. Intrinsic factors such as inoculation immune response and salivary characteristics can influence the biodiversity of the biofilm as well how robustly it can “deal with” ionic and pH changes and challenges.

When considering the biofilm on the tooth surface, it would appear that there are multiple bacteria associated with dental caries. Previously researchers have concentrated their efforts on a few easily cultivated “suspects” (*Streptococcus mutans*, *Streptococcus sobrinus*, and Lactobacilli); however, as the detection and quantification of bacteria is improved with technology based on m16sRNA, it has become apparent that many other bacteria are involved in the process.

The many acidogenic and aciduric bacteria have a small niche in a healthy oral biofilm. However, if there is frequent exposure to fermentable carbohydrates, especially sucrose or fructose, then the characteristics of the biofilm change due to the decrease in pH and secretion of glycans. The “cariogenic” bacterial thrive and multiply, disadvantaging bacteria associated with a healthy biofilm, a so-called amphibiotic shift.

The Balance of Caries

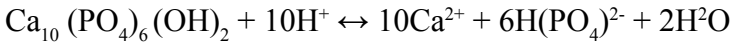
The chemical and behavioral context of this knowledge is that diet, in conjunction with salivary characteristics, immune response, and the quality of the tooth structure, are the major personal factors in caries risk; and apart from diet, these factors have a genetic “overlay.” The moderation of caries risk via establishment of a healthy diet, effective oral hygiene, and the use of topical agents such as fluoride or calcium containing technologies such as casein phosphopeptide– amorphous calcium phosphate are the important factors in the caries balance.

Oral hygiene methods such as brushing and flossing have an important role to play in the prevention and remineralization of dental carious lesions. The limitation of oral hygiene is that it requires compliance and dexterity, often limited in children. The use of fluoridated toothpaste is also a pivotal factor in oral hygiene as it relates to dental caries. The efficacy of brushing and flossing is limited in pits and fissures, reinforcing the importance of pit-and-fissure sealants and/or surface protection of these “at risk” areas. There is limited evidence regarding the efficacy of interproximal cleaning, however, lack of evidence isn’t lack of effect, and it would seem sensible that disrupting and removing the biofilm in a biofilm-moderated disease is a sensible idea, let alone for the periodontal benefits.

Apart from community water fluoridation, one of the most effective delivery vehicles for fluoride is toothpaste. Toothpaste is relatively cost-effective and safe, and variable concentrations are available that can be used for individual risk. For children who have high caries risk, the use of “adult strength” toothpaste (1,000-1,450 ppm F) should be considered as there is some doubt regarding the effectiveness of toothpaste with less than 1,000 ppm specifically manufactured for children. The ingestion of fluoridated toothpaste should be limited, so in young children a small smear of paste across the brush should be used, and the child encouraged to expectorate the paste after brushing. The child should not rinse, as residual paste left in the mouth increases the efficacy.

White Spot Lesions (WSL)

The demineralization of enamel can be illustrated simplistically as:



This formula indicates the influence of an acidic environment. However, the situation is rather complicated and relates to the saturation of the solution as it relates to tooth mineral. So the often-quoted Stefan curve with demineralization occurring at pH 5.5 is not wholly correct—this relates to an environment of ideal salivary characteristics. The tooth mineral will dissolve to equilibrate the solution when undersaturation with respect to tooth enamel exists. So it is dependent not only on pH but also on calcium and phosphate ion concentrations.

As long as saturation or supersaturation of calcium and phosphate is maintained with respect to tooth mineral, demineralization will not occur, even at low pH levels. So maintenance of saturation in the fluid around the crystals to keep the balance favoring mineral gain is one of the main goals of caries prevention.

Once demineralization has progressed, the initial, or WSL of enamel becomes visually apparent after a period of a few months. This stage of the carious lesion is reversible as long as the surface layer exists, reinforcing the importance of early diagnosis and timely modification of risk factors.

Activity, depending on the caries risk factors at the time, can vary determining whether the lesion is at a period of net mineral loss or gain. Visually, this can be observed as a shiny (inactive) or matt/frosty (active) surface.

Interestingly, in the presence of bioavailable calcium and phosphate, active lesions can remineralize more effectively than inactive, probably due to the porosity of the surface layer allowing greater diffusion of the Ca^{2+} and PO_4^{3-} into the lesion more readily than a lesion with a relatively highly mineralized surface layer. Although remineralization is diffusion limited, and cannot occur quickly.

Quantifying WSL is important as it allows longitudinal monitoring of progression/regression. There are several ways of doing this, including newer carries indices: ICDAS II, and CAST and electronic measures such as QLF[®], DiagnoDent[®], Sopralife[®], SopraCare[®] and Canary[®].

Fluoride

Apart from establishing a low-cariogenic diet, fluoride is the primary method of caries prevention and promoting remineralization, with fluoridation of public water lauded as one of the most significant public health measures of the last century.

When fluoride is present in the plaque and enamel fluid, the dynamics of demineralization/remineralization are changed. Saturation of this fluid now relates to fluorapatite (FA), which is markedly less soluble than hydroxyapatite (HA). Therefore, the pH decrease needs to be greater to cause demineralization. In other words, it is easier to maintain saturation when fluoride is present, so the fluoride decreases demineralization and increases remineralization and the resultant remineralized enamel is less soluble.

A simple example of the action of fluorides is when plaque fluid is at a pH value where calcium and phosphate concentration just maintains saturation with respect to HA. The moment a fluoride ion is added to the environment, the fluid is supersaturated with respect to FA, therefore driving remineralization rather than the potential for demineralization.

The limitation of fluoride with respect to remineralization is the bioavailability of calcium and phosphate ions. As these ions are present in saliva and gingival crevicular fluid (GCF) at relatively low concentrations, remineralization is limited by these factors unless an extrinsic source of calcium and phosphate is available. It can be said that the remineralization potential of fluoride is “saliva limited.”

Fluoride varnish is the most effective product to use for high-concentration fluoride application in children. It can be applied to areas of risk by dental professionals or non-dental staff such as dental therapists, nurses, and other allied health personnel after appropriate training. The varnish normally is

made up of a rosin or resin base, and most commonly 5% sodium fluoride. The use of fluoride varnish has a significant preventive effect for the development of carious lesions. The ability of fluoride varnish to prevent carious lesions and decrease caries risk is associated with the frequency of application—it is less effective if placed once per year compared with twice per year, and increasing application frequency up to four times per year has an even greater preventive effect in those at risk.

Recently, varnishes containing bioavailable calcium and phosphate have become available, and these products have the potential to increase the efficacy of the fluoride varnish by providing essential ions to increase remineralization. The application of fluoride varnish is safe in children as it does not increase plasma fluoride concentration significantly when compared with other products such as fluoride gels.

CPP-ACP

In recent years, commercially available topical agents containing calcium and phosphate have appeared in the marketplace.

The major limitation of these products is that calcium and phosphate when together in a product can only be added in small amounts due to their relative insolubility, unless the calcium and phosphate are separated in some way to allow a higher concentration to be added.

If solutions that are supersaturated with respect to tooth mineral can be created and the calcium and phosphate ions are bioavailable, then this helps drive remineralization and limit demineralization.

One product that has been available for the past decade is casein phosphopeptide–amorphous calcium phosphate (CPP-ACP), a casein-derived peptide which stabilizes small bundles or complexes of calcium and phosphate via its phosphorylated serine groups. This allows stabilization of large amounts of stabilized calcium and phosphate, over 100 times saturation with respect to tooth mineral.

The CPP-ACP binds into the biofilm, coats the tooth surface, and releases calcium and phosphate after binding. They also release the ions with a pH decrease. This creates a high concentration of bioavailable calcium

and phosphate in the plaque (and subsequently enamel) fluid, driving remineralization and inhibiting demineralization.

The CPP also alters the characteristics of the biofilm and changes the adherence characteristics of cariogenic bacteria such as *S. mutans* and *S. sobrinus*, decreasing their numbers and subsequently reducing the caries risk.

A large number of papers relating to CPP-ACP (>150 at present) have been published. These have been *in vitro*, *in situ*, and *in vivo* studies supporting the efficacy of CPP-ACP in relation to enamel remineralization. Several types of products such as topical creams, chewing gum, and cow's milk containing CPP-ACP are available.

When fluoride is present with CPP-ACP, the fluoride tends to be incorporated into the CPP-ACP complex and remain bioavailable despite the presence of high concentrations of calcium and phosphate. Unlike products with unstabilized calcium and phosphate, fluorapatite is not formed in the product due to stabilization by the CPP, and precipitation at the tooth surface is also controlled, allowing remineralization deep into the carious lesion.

The mechanism by which CPP-ACP promotes remineralization is that it stabilizes the calcium and phosphate (and fluoride if present) in relatively correct ionic ratios at the surface of the tooth and the ions (in supersaturated form with respect to the tooth mineral), then diffuses into the tooth ionic concentration gradients—subsequently forming hydroxyapatite or fluorapatite.

Studies have shown that including Tooth Mousse into a postorthodontic treatment preventive regimen significantly increased the remineralization of white spots formed around the recently removed orthodontic brackets. Interestingly, research indicates that remineralization occurs best at a pH of 5.5 when CPP-ACP is present, due to the presence of “neutral ion species” such as CaHPO_4 , reinforcing that the “critical pH” is variable and dependent on the concentration of calcium and phosphate in the solution at the time.

There are several other Ca/PO_4 technologies available, however none are stabilized in the manner of CPP-ACP. Technologies such as ACP,

Novamin, and TCP all rely on dissolution of calcium and phosphate as they are mixed with saliva, and once this has occurred the ions are prone to surface precipitation when saturation with respect to tooth mineral is reached.

In summary, the prevention of dental caries and early detection and remineralization of white spot lesions should be a priority with the aim of maintaining and improving oral health. Dietary control is the primary method of controlling caries risk, although unfortunately it has been considered as having secondary importance by many in the field. Fluoride is an important tool in prevention of dental caries, however its remineralization potential is limited by ionic calcium and phosphate availability. Therefore, the availability of a product such as CPP-ACP to increase significantly the amount of bioavailable calcium and phosphate is a great advantage. This is due to three major mechanisms of action:

1. Inhibition of demineralization
2. Promotion of remineralization
3. Improving resistance of remineralized enamel to subsequent demineralization

Caries risk should be considered in a holistic manner, with a diet low in fermentable carbohydrates, effective oral hygiene, regular fluoride use, and maximization of bioavailable calcium and phosphate the platform from which sound oral health can be maintained.

Tooth Surface Protection

The Right Time for Tooth Protection

When a molar tooth is erupting, the caries risk will be almost doubled. This is caused by the pain in the area of a newly erupted tooth when a child brushes his teeth. Consequently, food waste easily adheres to the teeth, and it is digested by bacteria to become acid that can dissolve tooth enamel. Furthermore, during the erupting stage, the enamel structure is still vulnerable to acid attack due to high carbonate content. The enamel structure of a newly erupted tooth needs three years to mature in order to replace carbonate bonds. Therefore, that is the period when extra protection is needed more than any other time.

Surface protection is a proactive therapy to mature an erupting molar. Erupting molars contain carbonate bonds that may easily be dissolved in acid. By maturing the erupting molars, the carbonated apatite structure is replaced with fluoride apatite which is more resistant to acid. In three minutes, an erupting molar can be saved from high-risk caries.

Procedure

1. Clean the erupting molar surface with dentin conditioner to remove the smear layer (layers smearing tooth surfaces).
2. Wait for 15 seconds, then wipe it out with a wet cotton ball. Dry with dry cotton ball. Isolate teeth with cotton rolls, change cotton rolls frequently with dry ones so working area remains dry.
3. Prepare the pink colored fluoride-rich glass ionomer cement (GIC) of stabilization and protection material type.
4. Apply the glass ionomer filling on the surface of the erupting molar. Apply cocoa-butter on a finger, and press it on the glass ionomer applicator and slide it sideways
5. Instruct the patient not to eat for at least one hour.

This was my nephew's case. He was 6 years old and his molar has just erupted. But as we can see, the newly erupted molar has already started to decay here and there. So we decided to quickly cover it up with surface protection using GC Fuji 7 Capsules, a GIC material. Resin has not been the choice, since the tooth is still attached to the gum, and there is no other way to keep the dry isolation toward the occlusal. However GIC works best in moist situations such as this.



Figure 25. Before and after fissure protection using Fuji VII pink GIC.

Benefits

1. Maturing the enamel of the erupting molar surface to accelerate the formation of more acid-resistant fluoride apatite
2. Protecting the black fissures on occlusal surfaces which have high risk of caries

Materials

1. Easy flowing glass ionomer, strontium-based material for stabilization and protection (pink color). In this program we use GC Fuji 7 (GC Fuji Triage).
2. Dentin conditioner
3. Cotton roll, cotton pellet

4. Water on Dappen glass
5. Standard instrument package

Patient Position

In most cases, the supine position has advantages such as reducing stress on children and easier saliva control (saliva automatically descends to the throat so it does not contaminate the working area).

Moisture Management

Another major problem is moisture control. Before GIC application, make sure the oral environment is dry using only cotton roll. Avoid blowing with pressurized air, since the bond between GIC and tooth is a chemical bond that needs a moist environment to be able to react. After the application of GIC on the tooth surface, coat the GIC surface with cocoa butter using finger press technique. Cocoa butter protects GIC for 24 hours from the possibility of water absorption.

In most cases, working with Glass-ionomer Cement (GIC) needs special attention. The use of *Dentin Conditioner* before applying GIC is beneficial to remove smear layer and prepare dental ion for the ion replacement process with GIC. Without the use of *Dentin Conditioner*, bonding strength may decrease down to 50%.



‘Figure 26. Dr. Made Artaya is conducting surface protection. The child is lying down.



Figure 27. Dr. Dewi Ari from Health District West Kalimantan applying surface protection in the school, using Irene's bench.



Figure 28. Little doctors from school in Tarakan, North Kalimantan, preparing the working site for Surface Protection.

Theory Behind Surface Protection

The Atraumatic Restorative Treatment (ART) approach for managing dental caries

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The Atraumatic Restorative Treatment (ART) Concept

Currently, ART is defined as a minimally invasive care approach to preventing dental caries and stopping its further progression. It consists of two components: sealing caries-prone pits and fissures and restoring cavitated dentine carious lesions with sealant-restorations. The placement of an ART sealant involves the application of a high-viscosity glass-ionomer that is pushed into the pits and fissures under finger pressure. An ART restoration involves the removal of soft, completely demineralized (decomposed) carious tooth tissues with hand instruments. This is followed by restoration of the cavity with an adhesive dental material which simultaneously seals any remaining pits and fissures that remain at risk. Opening the cavity with rotating instruments, followed by cleaning it with hand instruments and restoring it with an adhesive restorative material, is not considered ART nor can calling it modified-ART be justified.⁶ Meanwhile, the use of ART is no longer restricted to low- and middle-income countries. There is evidence that ART application has spread to most countries in the world. In many countries ART is part of the dental curriculum.⁷⁻⁹ Many private practitioners in BRIC and Western countries use it to complement other treatment concepts in the provision of dental care to their clientele. Because it seems that the use of ART is growing in many parts of the world, this was considered an appropriate time for presenting and discussing the knowledge, experiences, and study results regarding various aspects of ART. That is the aim of the present chapter.

ART Sealants

When are ART sealants indicated?

A sealant is placed to allow easy plaque removal from pits and fissures systems. A sealant changes a morphological uneven surface into a smooth surface. Well-placed sealants remain effective as long as they are regularly kept free of plaque. They are indicated for use in children with high caries risk. Factors that determine this risk include: past caries experience in primary dentition, deep pits and fissures, active enamel carious lesions, and operator experience.^{10,11} So, sealing any pits and fissures, irrespective of the state of the caries risk of the child, should be considered overtreatment.

The indication for placing an ART sealant is no different from that for placing a resin-based sealant. However, glass-ionomers are more hydrophilic than resin-based materials. It is, therefore, logical to assume that a glass-ionomer rather than a resin-based material should be used in sealing caries-prone pits and fissures which cannot be kept absolutely moist-free, such as in erupting molars and in children with behavior problems. This does not mean that glass-ionomer (ART) sealants can be placed under “wet” conditions. As far as possible, the ART protocol should be followed (Table 1, Figures 2 and 3). However, placing a resin-based sealant under moist-to-wet conditions is contraindicated.

Decades ago, low- and medium-viscosity glass-ionomers were introduced to seal caries-prone pits and fissures. However, these materials have a lower rate of retention than the high-viscosity glass-ionomers, introduced in the mid-1990s. It is, therefore, obvious that the latter type of glass-ionomer be used as a sealing material.

Why could sealing erupting molars be important? During the 1- to 1.5-year eruption phase molar teeth are most vulnerable to demineralization. In contrast with fully erupted molars, larger parts of occlusal surfaces in erupting molars are covered by plaque that remains in place for longer periods in time.¹² Depending on the caries risk situation of the child, occlusal surfaces should either be cleaned regularly or be sealed. The effectiveness of cleaning is increased if parents/caregivers are properly trained. A recently published study supports this statement. The study showed no difference in caries preventive effect of a resin sealant, an ART

sealant, and supervised tooth brushing alone in occlusal surfaces of first permanent molars at schools after 3 years.¹³

How effective are ART sealants?

Retention of sealants

Retention of sealant material should not be considered the endpoint for determining the success of a sealant, as biological outcomes take preference over mechanical outcomes.¹⁴ So, should teeth with partially lost sealants be resealed? A sealant should be considered a temporary treatment. It is meant to assist the young individual and parents/caregivers to keep vulnerable tooth surfaces free of carious lesions during a period in his/her life in which tooth cleaning is still being learned and is not fully under control. The lifespan of a sealant in the first molar should, therefore, be about 5 years. During this period, emphasis should be placed on improving the child's behavior regarding plaque control and sugar intake. Obviously, children who remain at high risk of caries will benefit from resealing material-defective sealants. However, resealing once the caries risk is low is not required.¹³

Table 1. Step-by-step description of the placement of an ART sealant.

1. Isolate the tooth with cotton wool rolls. Keep the treatment area free from saliva.
2. Gently remove plaque and food debris from the deepest parts of the pits and fissures with an explorer.
3. Wash the pits and fissures, using wet cotton wool pellets.
4. Apply enamel conditioner into the pits and fissures according to the manufacturer's instructions. Condition for the specified time.
5. Immediately wash the pits and fissures, using wet cotton wool pellets to clean off the conditioner. Wash 2-3 times.
6. Dry the pits and fissures with cotton wool pellets. Do not use the 3-way syringe. The enamel surface should not be desiccated.

7. Mix the glass-ionomer and apply it in all pits and fissures with the round end of the ART applicator/carver instrument or shake the encapsulated glass-ionomer in a suitable mixing machine and extrude the mixture into all pits and fissures.
 8. Rub a small amount of petroleum jelly on the gloved index finger.
 9. Press the glass-ionomer mixture into the pits and fissures with the index finger (press-finger technique). Then, remove finger sideways after 10-15 seconds.
 10. Remove visible excess of mixture with the carver or a large excavator.
 11. Check the bite, using the articulation paper, and adjust until comfortable.
 12. Remove the petroleum jelly top surface with the carver or a large excavator when the mixture is partly set.
 13. Apply a new layer of petroleum jelly.
 14. Remove the cotton wool rolls.
 15. Ask the patient not to eat for at least one hour.
-

When the retention of glass-ionomer and resin-based sealants is compared, resin-based sealants are longer retained.¹⁵ However, with the launch of high-viscosity glass-ionomers in the mid-1990s,¹⁶ the retention rate of glass-ionomer (ART) sealants has increased substantially in comparison to those of the low- and medium-viscosity glass-ionomers previously used.¹⁷

A meta-analysis that included studies up to February 2010 concluded that the mean annual failure rate of completely lost high-viscosity glass-ionomer ART sealants over the first three years was 9.3%.¹⁸ This finding corroborates the result of the latest published sealant retention study from China, which showed a 4-year survival rate of fully and partially retained high-viscosity glass-ionomer ART sealant in occlusal surfaces, of 56% compared to the 81% for resin-based sealants (Figure 4).¹⁹ These retention survival percentages are much higher than those obtained for low- and medium-viscosity glass-ionomer sealants in the 1980s and early 1990s.^{20,21} Clearly, as an integral part of the ART approach, high-viscosity glass-ionomers should be used to seal caries-prone pits and fissures.



A



B



C



D



E



F



G

Figure 2. ART sealant step-by-step using a high-viscosity glass-ionomer (© Prof. S.C. Leal)

A) Tooth 46 with a pit-and-fissure system that required a sealant protection. B) Remove debris from the pits and fissures with a sharp probe. C) Condition the occlusal surface and pits and fissures with a cotton wool pellet, dipped in polyacrylic acid. D) After washing, dry the occlusal surface and pits and fissures with a dry cotton wool pellet (look at the cotton wool pellet, the down part is wet and has absorbed sufficient moist while the top part is still dry). E) Place the glass-ionomer mixture into the pits and fissures with the applicator/carver instrument and spread it over the pits and fissures with the round end of a medium size excavator. F) Press the glass-ionomer mixture into the pits and fissures with the index finger. G) Check the bite and remove excess glass-ionomer material with hand instruments. Apply a layer of petroleum jelly over the ART sealant and ask the patient not to eat for at least one hour.





Figure 3. ART sealant step-by-step using a high-viscosity glass-ionomer. (© Prof. F. de Lima Navarro). The various steps have been explained in the text associated with Figure 2.

Caries prevention with sealants

Already in the mid-1990s, Simonsen²² concluded his critical review saying that the evidence of the caries-preventive effect of low- and medium-viscosity glass-ionomer and resin-based sealants was equivocal. This conclusion matched the outcome of a systematic review²³ which included twice as many publications as that of Simonsen.²² Three later published systematic reviews and meta analyses, which had meanwhile included high-viscosity glass-ionomer ART sealants, showed that “there is no evidence that the dentine carious lesion-preventive effect of the one sealant material is better than that of the other.”²⁴⁻²⁶ The De Amorim¹⁸ meta-analysis reported a mean annual dentine carious lesion incidence rate, over the first three years in pits and fissures previously sealed according to the ART protocol, of 1%. This outcome is in line with a randomized clinical trial that reported a mean annual dentine carious lesion development for ART high-viscosity glass-ionomer sealants of 2% in comparison to that of 5% for the resin-based sealants over a 5-year period.²⁷ This high caries preventive effect of ART high-viscosity glass-ionomer sealants was also reported for the latest published glass-ionomer and resin-based comparison study from China. After 4 years, 3% of the pits and fissures sealed according to the ART procedure had developed a cavitated dentine carious lesion, in comparison to the 4% observed in pits and fissures sealed with the resin sealant.²⁸

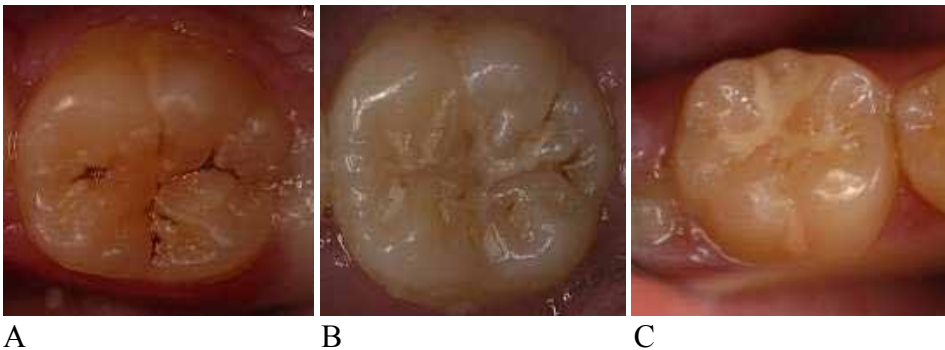


Figure 4. A) Sealant completely disappeared from the occlusal surface but not from the buccal surface, B) partially, and C) fully retained high-viscosity glass-ionomer ART sealants after 4 years. (© Dr. Hu Xuan)

Possible extra reason for the effectiveness of glass-ionomer sealants

The findings of these systematic reviews and meta-analysis may be a surprise to many, particularly as resin-based sealant materials are retained longer than the glass-ionomer sealant materials and should, therefore, automatically have a high cavitated dentine carious lesion-preventive effect. More than two decades ago, Mejäre and Mjör,²⁰ and Torppa-Saarinen and Seppä²⁹ discovered that in situations where the low-viscosity glass-ionomer sealant material used had completely disappeared clinically, remnants were observed in the deeper parts of the pits and fissure systems. They ascribed the remnants as being most probably glass-ionomer. They further suggested that the relative absence of cavitated dentine carious lesions in relation to the high level of clinically completely disappeared glass-ionomer sealants might, among others, be explained by the presence of those remnants. The remnants might allow the removal of plaque from a less than normal depth of the pits and fissure system and thus better control possible demineralization. This possible explanation for the low level of cavitated dentine carious lesions observed in pits and fissures previously sealed with glass-ionomers received further support from a case study.³⁰ Four long-term (8 to 13 years) high-viscosity glass-ionomer ART sealants were subjected to SEM investigations (Figure 5). In all these sealants, remnants were observed on places that had been clinically assessed as not containing glass-ionomer material. These remnants appeared to be glass-ionomer. Considering the excellent adhesion of glass-ionomers to enamel and the fact that the material fractures in itself rather than at the enamel-sealant interface,³¹ the remnants might indeed be part of a glass-ionomer sealant. This phenomenon needs further investigation.

Whether the phenomenon described above is indeed the reason for the reported higher risk for developing a cavitated dentine carious lesion in pits and fissures previously sealed with a resin-composite sealant in comparison to similar surfaces previously sealed with a glass-ionomer,³² is difficult to conclude from the studies referred to above.

Latest development regarding dental materials

It is known that Bisphenol A (BPA) derivatives are released from dental

resins.^{33,34} These substances have recently been linked to a number of biological disorders.³⁵⁻³⁷ This has led the World Dental Association (FDI) to issue a policy statement on BPA, discouraging its use in the manufacturing of dental materials, highlighting greater awareness and importance of caries prevention, thereby reducing the need for dental restorative materials.³⁸

As the future regarding BPA-containing dental materials is uncertain, the dental profession can assure the public that it is able to manage caries lesions through the use of sealants because of the availability of a non-BPA containing (ART) high-viscosity glass-ionomer sealant that has a high level of effectiveness.

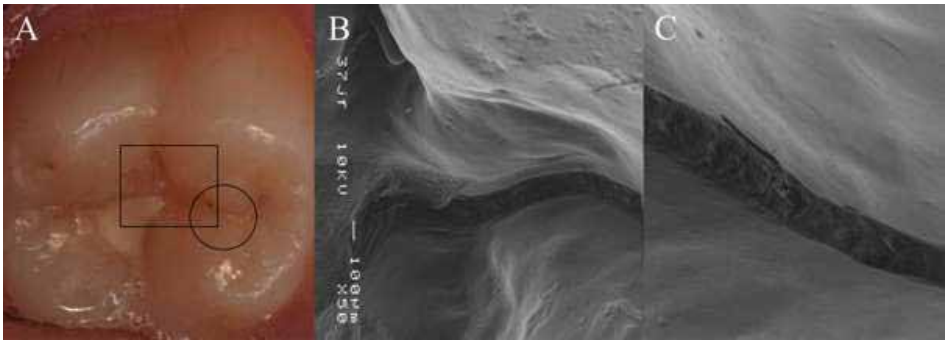


Figure 5. A) Clinically undetected glass-ionomer material 8 years after sealing the occlusal surface of tooth 37. The connecting fissure from mesial to central pit is clinically free of glass-ionomer material. B) The SEM image (50x) show the fissure to be filled with a substance that is connected to the visible glass-ionomer. C) Enlargement of Figure 3B (SEM: 100x). The fissure is clearly filled with a material that is most likely remnants of the high-viscosity glass-ionomer sealant material. (© Prof. J.E. Frencken)

Conclusions Regarding ART Sealants

Systematic reviews have shown that the caries-preventive effect of either glass-ionomer-based or resin-based materials are comparable. High-viscosity glass-ionomers appear to be retained longer than low- and medium-viscosity glass-ionomers, but shorter than resin-based sealant materials. High-viscosity glass-ionomer ART sealants have a high ability

to prevent cavitated dentine carious lesion development. Because no electricity and running water is required, ART sealants can be placed both inside and outside the dental surgery.

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MASTERING THE DENTAL IMMUNIZATION STRATEGIES

Human Character

This is what you need to understand before you start.

Challenges

There are at least three behavioral challenges one might encounter when starting to develop community empowerment:

1. Adult learning process
2. Desire to change/lateral thinking
3. Characteristics of main stakeholders

1. Adult Learning Process

The dissemination of a Community Empowerment program, especially oral health, is closely related to the adult learning process. It is commonly known that adults are reluctant to study from other peoples' experience or advantage. Only 10% of adults are able to gain the wisdom or willingness (ability) to learn from others. Why? Learning from others is considered to lessen self-esteem, as if taking (or acknowledging) another person's idea would make their own "less valuable." Especially if the person initiating the idea or opinion is below their hierarchical and bureaucratic class. Only 10% of people act smartly by adopting someone else's good idea, instead of wasting their time to come up with similar ideas on their own. This however calls for an open mind in order to fully internalize the concept.

Based on the author's experience, in a community there are two types of people: one who is willing to learn and one who is unwilling to learn. There are people who are smart but remain willing to learn from other people, even from those with lower social status and intelligence. There are also people who are considered less smart but eager to learn. This group makes up between 10% – 15%. On the other hand, there are people who are smart and not willing to learn from others, even from more intelligent people from higher social hierarchy. There are also those who are not smart and not willing to learn. This group also makes up between 10% – 15%. The rest, about 65% - 75%, is the majority of people, who sometimes want to

learn, and sometimes are reluctant (assuming there are only 30% – 35% who are willing to study, although not seriously). Therefore, when you give a speech, sermon, or lecture that is one-way in nature, remember there is only 40% – 50% who listen, and out of that number 10% – 15% who really listen.

But, the number will drastically increase if listeners feel that what is being delivered has direct connection with their experience or interest.

One of the principles being applied in the Irene Donut risk assessment is FRAMES, or **F**eedback, **R**esponsibility to action the change with the individual, **A**dvice, providing a **M**enu of options, an **E**mpathic counseling style, and the enhancement of **S**elf-efficacy (Rollnick).

1. **Feedback:** for example, we must be able to provide “feedback” in the form of the actual problem in the patient’s condition that was previously unknown to parents/teachers, namely the level of severity and risks if the problem is not mitigated.
2. **Responsibility:** we persuade them that it is their responsibility to change unhealthy conditions to become healthy.
3. **Advice:** we give advice to mitigate the problem.
4. **Menu:** we give a list of options based on their ability to mitigate the problem. This is the main difference from regular counseling that is instructive, one way, and general in nature without considering individual ability.
5. **Empathy:** we must be able to internalize a person’s difficulty. When meeting with parents, we could share with each other how to handle problems.
6. **Self-efficacy:** we encourage the person to have more confidence to do the required improvement.

2. Lateral Thinking

Edward deBono in his book “Lateral Thinking” proposes two concepts of human thinking, namely vertical thinking and lateral thinking.

Vertical Thinking: is a way of thinking that is systematic, logical, mathematical, concentrating on “digging deeper,” routine, and selective. This is a way of thinking in general. This way of thinking makes it hard to accept new ideas. Every new idea creates a conflict that can only be solved, according to logical thinking, with the presence of evidence and replacing old ideas with new ideas should not require effort. By thinking vertically people live more comfortably. People tend to like stability because stability does not demand sacrifice or if it does, only the minimum.

Lateral Thinking: is a way of thinking that is “out of the box,” creative, experimental, concerned with “digging wider” or “digging somewhere else.” This way of thinking tends to change established pattern and therefore it may require sacrificing existing values, including self-worth because a person who is already within a certain pattern would equalize the pattern to his self-worth. Thus, any change or update, including the introduction of new concept, will be felt as a violation to self-worth.

It is now clear that lateral thinking is parallel with the adult learning process. The adult learning process can support the implementation of lateral thinking and, on the other hand, by using lateral thinking concept, the adult learning process can run smoothly.

3. Characteristic of Stakeholders

I was frustrated after five years thinking that the top rank bureaucrats could not be convinced about Dental Immunization. At the grassroots level, it was very successful and well accepted, but it was so difficult to change the mindset of faculty and other top people. When I attended the Senior Dental Leader 8 program in London, I was even more confused, because in that international meeting, many senior leaders acted very differently (compared to those in my country) and thought I had done great work. The same work received totally different feedback from different groups of people.

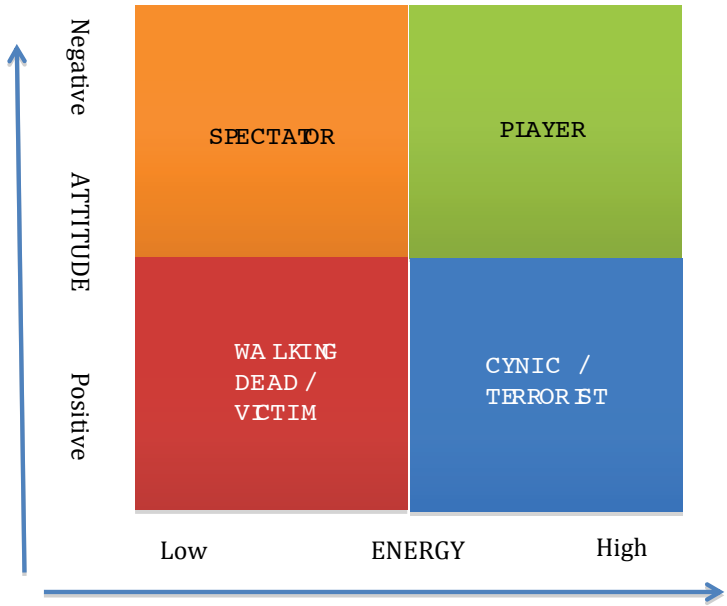


Figure 33. The Energy Investment Model (EIM) (Victor Group, 2009).

The way people behave in the work place may be illustrated into two independent dimensions. The attitude that they bring to work ranges from very positive to very negative and the energy brought up ranges from very high to very low. The two dimensions make up four simple boxes in a matrix named Energy Investment Model (EIM) (Victor Group, 2009). The interaction in this model allows the identification of different styles that people show in their communication with customers, colleagues, and the work itself. The styles are illustrated in the matrix shown above.



<p>High energy positive attitude. We call them PLAYER</p>	<p>Positive attitude, but not having enough energy. We call them SPECTATOR</p>	<p>Low energy, negative attitude, feel like being the victim of change. We call them VICTIM</p>	<p>High energy used for attacking and finding mistakes. We call them TERRORIST</p>
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Figure 34. Illustration of energy investment model (EIM).

It was a mentor, Tom Kennie, who opened my eyes. He explained it to me like this. “There will always be 10% who are ‘terrorist’ rejecting any changes you make, so it is normal. You just need to stay away from them and focus your energy somewhere else.” Since then I have never felt rejected.

When people say NO to your idea, it does not necessarily mean that your idea is bad, it is maybe just because you met a *terrorist*. Move on, don’t give up, and find yourself a *player*.

How to Identify the Characteristics



1. Player

Positive attitude, high level of energy. When you meet a Player, he/she will react like this:

- I will support you; what do you need?
- We will make this work
- Yes, we can do that
- This is very good, when can we start?

Player feels:

- Challenged and stretched by realistic goals
- Comfortable with changes and open to new ideas
- Optimistic about the longer-term future and in control of their own destiny
- Not afraid of short-term mistakes and set backs

Player reacts by:

- Seeking the “silver lining”
- Viewing changes as opportunity
- Treating life as a continual learning experience
- Expanding their personal comfort zone

Player needs:

- Respect and recognition from others when they make a positive change

- Latitude to “do it their way”
- Support from the team members when they take a stand against a cynic
- Receive work that is abandoned by others



2. Spectator

Positive attitude, but low level of energy. You will know that the type of the person is a spectator when he/she comments:

- “It is a good program but we have no budget”
- “We support your idea but we have no money for this”
- “It is good, we will think about it” but then no continuation

Spectator feels:

- Positive about what is happening
- Most comfortable when “watching from the sidelines”
- Anxious and lacking in confidence
- Reluctant to take risks

Spectator reacts by:

- Acknowledging the good ideas of others but reluctant to change themselves
- Keeping a low profile
- Avoiding taking undue risks

Spectator needs:

- Effective role models
- Help in coping with their lack of confidence
- Stretching but achievable challenges
- Plenty of feedback and positive reinforcement from other set members



3. Victim

Negative attitude, low level of energy. Mostly their reaction would be like this:

- “It is difficult, we already have many responsibilities”
- “We have tried but people are not easy to convince”
- “It is hard to do”
- “It is impossible to apply in my place”
- “We have done this, but ...but... but...”
- “We do not have enough time”
- “This is extra work for us”
- “We are busy”

Victim feels:

- Unhappy or depressed
- Low self-esteem
- Overwhelmed by work

- Powerless and fearful of mistakes

Victim reacts by:

- Blocking out challenges
- Avoiding confronting issues
- Retreating into safety
- Avoiding risks and doing the minimum
- Avoiding thinking about what might happen

Victim needs:

- To play a more positive role in the team
- To ask for help if the assignment looks heavy
- To consider the effect of attitude on other members
- To consider the job as ideal and do it



4. Cynic/Terrorist

Negative attitude but with high level of energy. When you meet a terrorist type, it is usual to hear them say:

- “It cannot be done here”
- “It is not proven yet”
- “We know what to do and no need to give us suggestions”
- “If your findings are not written in a journal, it is not acceptable”
- “You may not do it here!”

Cynic feels:

- Not listened to
- Rebellious and determined to block changes
- That they are “right” – and angry at the world for ignoring them
- Overly confident in their own ability

Cynic reacts by:

- Expressing their frustration over the pain and hesitancy displayed by others
- Always seeing the negatives
- Pressing for quick solutions and then criticizing them
- Being oblivious to the consequences of their negativity on others
- Bringing both Victim and Spectator around to their own perspective

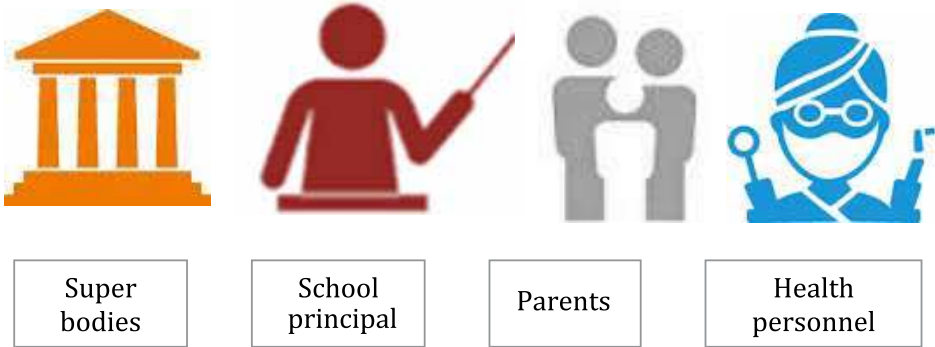
Cynic needs:

- To do less talking and more listening
- To be confronted about the negative aspects of their behavior
- To be paired with a Player
- To be given a chance to take personal responsibility for their actions

Energy investment model is not designed to label someone. But by knowing the characteristics of everyone, it guarantees a success in team management. Character identification creates awareness on how to handle everyone accurately.

Team Selection

Identifying who the stakeholders are in your activity is a very crucial step. Based on our experience in developing community empowerment in a school oral health system, there are at least four kinds of stakeholders, but there can be more.



1. “Super bodies” such as Provincial Offices (Regional level I), District/Township Offices (Regional level II), Regent, Mayor, Community Health Center (CHS)
2. School institutions, specifically the principals
3. Parents/students
4. Field executors (dentists/dental nurse)

To be successful, a team needs to consist of those four stakeholders. For the team, most will already have the skill set needed; if the skill set is not there, it can be trained! So, the next consideration is human character.

When you want to build a football team, you will select those people who are competent and skillful, have good teamwork, etc. Basically you want to build a winning team, not just an ordinary team. In empowerment, you need the same strategy. Select your team!

Success/Failure Analysis

1. Important Role of Initiators

The most important aspect of this program is the “Initiator” which is the key for disseminating the program. Experience proves that there are many kinds of initiators who have succeeded in promoting this program, such as:

- Provincial health district level (for example in West Kalimantan)
- Regency/Township Health Office level (for example in cities such as Pontianak, Kuburaya, Mempawah, Sambas, Singkawang, Landak, Tarakan, Solok, Semarang, Salatiga, Tangerang, and Bontang)
- Polytechnic School (for example Dental Nurse School in Semarang city)
- Group initiatives from Indonesian Dental Association (IDA)/nurses/principal/Community Health Centre/Faculty of Dentistry (Bali – Denpasar)
- Faculty of Dentistry (Dental Faculty of UPDMB)
- School principals (such as in Denpasar and Kubu Raya)

These Initiators are expected to be “guardians” to watch over the sustainability and development of the program.

2. Level of Success

Out of 108 schools that have applied community empowerment in oral health using the Dental Immunization approach, 86% have succeeded in maintaining the sustainability of the program and 14% failed.

Table 11. Number and percentage of success and failure of sustainable Dental Immunization programs in seven provinces, 21 locations

	Number of schools	% of schools
Success	93	86%
Failure	15	14%
Total	108	100%

3. Combination of Three Actors for Success

Table 12 below shows that when there are at least four or more players, based on experience, the program will run sustainably. When there are only three players, a maximum of one only is spectator type and the rest should be player type. When there are four players, a maximum of two spectator type and the rest should be player type. Fewer than that, the program will not be sustained. The characteristics of Victim and Cynics are only found in failed community empowerment.

Table 12. Successful and failed combinations of players. Sustainable Dental Immunization in seven provinces; 21 locations, 108 elementary schools.

Cities	Schools	Player	Spectator	Victim	Cynics	Result
1	21	6	0	0	0	Success
2	5	6	0	0	0	Success
3	9	5	0	0	0	Success
4	5	5	0	0	0	Success
5	3	5	0	0	0	Success
6	1	5	0	0	0	Success
7	1	5	0	0	0	Success
8	24	4	0	0	0	Success
9	6	4	0	0	0	Success
10	3	4	0	0	0	Success
11	1	4	0	0	0	Success
12	1	3	1	0	0	Success
13	12	2	2	0	0	Success
14	1	2	2	0	0	Success
15	1	2	1	1	0	Fail
16	7	2	1	0	1	Fail
17	1	1	2	0	0	Fail
18	1	1	2	0	0	Fail
19	2	1	1	1	0	Fail
20	1	0	1	1	1	Fail
21	2	0	1	1	0	Fail

Table 13. Summary of successful and failed combination of actors. Sustainable dental immunization project in seven provinces, 21 locations

Combination of players	Combination of spectators	Combination of victims	Combination of cynics	Result
6				Success
5				Success
4				Success
3	1			Success
2	2			Success
2	1	1		Fail
2	1		1	Fail
1	2			Fail
1	1	1		Fail
		1	1	Fail
		1		Fail

Success recipe:

Minimum four stakeholders/actors, preferably all are player type.

In unfavorable conditions, the team must consist at minimum of two players supported by two spectators. Any victim or terrorist in the team means failure.

4. Actors’ Characteristics and Level of Success

During the past five years, many actor combinations were tried in many places. The actors’ characteristics and their level of success are shown in Table 15 below.

In some regions, the Provincial Health Office was used as the Initiator, and they usually have the character of Player. Out of 31 elementary schools being nurtured, 28 (90%) successfully maintained the Dental Immunization program. The Provincial Health Office only plays the role of socialization and passed coordination of activities to a lower level, city health district, therefore it is understood that the level of success was not 100%.

In another region, the City Health District was used as the Initiator, which happened to have the character of Player as well. All 44 elementary schools that are being nurtured are successful (100%). This is possible because the city directly manages the program.

The same goes with the Community Health Center.

Regency Education Office is also the Player, but the level of success is 93%.

Dental Nurse School/Foundations who have been offered the Dental Immunization program have various characteristics. Sixty-three percent (63%) are Players, but there are 16% of them who feel like Victims, and 22% of them Cynics. This is understandable, because some of the institutions' personnel still have Vertical thinking, making it difficult for them to accept changes, therefore the level of success is only 63% (the lowest).

Among school principals, 84% are Players, 15% Spectators, and 1% Victims; the level of success is 77%.

Among the parents, 97% are players, 3% Spectators; the level of success is 87%.

The characteristics of health personnel as executors are varied. Seventy-five percent (75%) are Players, 24% Spectators, and 1% Cynics; the level of success is 75%.

As a conclusion, it is observable that the closer the Initiator is to the operational activities, the higher the possibility of success.

Table 15. Summary of actors/Initiator’s characteristics and its relation to level of success. Sustainable Dental Immunization in seven provinces, 21 locations.

	Provincial Health Office	District Health Office	Community Health Center	MOE/ Education Office	Dental Nurse School / Foundation	Principals	Parents	Health personnel
Number of schools managed by	31	44	70	28	32	104	78	107
Players	100%	100%	100%	100%	63%	84%	97%	75%
Spectators						15%	3%	24%
Victims					16%	1%		
Cynics					22%			1%
Success	28	44	70	26	20	80	68	80
Success rate (%)	90%	100%	100%	93%	63%	77%	87%	75%

5. SWOT Analysis

The most important aspect of this program is the “Initiator” who is key in disseminating the program. In accordance with the experience up to this point, SWOT analysis will be conducted on all Initiators in the past, present, and future.

The Ministry of Health

Strengths

- It has moral responsibility toward the improvement of community dental health, specifically developing the program of empowerment of schooling community via Dental Immunization.
- It has inserted Innovative School Oral Health (Dental Immunization) programs in the **Guideline of School Dental Health Services (UKGS) by the Ministry of Health in 2012.**
- It is able to conduct socialization and intensive Dental Immunization training.

Weaknesses

- Dental-related human resources are too few, thus producing weak “breakthrough.”
- The issued policies/guidelines are not effective because not supported by a budget.

Opportunities

- It can coordinate across programs such as Education Center For Health Personnel, Education and Training Center of Health Employee, National Institution of Health Research and Development, and across sectors such as the Ministry of National Education, Faculty of Dentistry, and related professional associations.

Threats

- Dental health program is not a priority.

The Ministry of Primary and Secondary Education

Strengths

- Have funding/grant; Dental Immunization was first run using a grant from MOE.
- The School Health program is already known within the primary education environment.
- Government has available funds for school operation that can be used for oral health program.

Weaknesses

- The empowerment in schooling community via the Dental Immunization program does not generate interest.

Opportunities

- When Dental Immunization explicitly becomes a program for pre-kindergarten/ kindergarten/first and second grades of elementary school and continues incrementally to sixth grade (when second molar erupts), the program will be sustainable.

Threats

- There is no need yet to develop the existing program.
- There is no access yet to the Ministry of National Education to continue and sustain the Dental Immunization program.

- Dental health program is not a priority.
- No one is yet able to convince them of the necessity for empowerment in the schooling community in the form of Dental Immunization implementation.
- It is not easy to accept change.

Provincial Health Office

Strengths

- It is accessible, being the extension of the Ministry of Health.
- It can promote the program in its localities.
- It can organize a Dental Immunization model.

Weaknesses

- It has no operational capability in Regencies/Townships.
- Not everyone accepts the idea/concept of the empowerment of schooling community via Dental Immunization.

Opportunities

- It can coordinate with the Education Office to develop the concept of the empowerment of the schooling community via Dental Immunization.

Threats

- Dental health program is not a priority.

Regency/ Township Health Office

Strengths

- It has the resources, funds, and authority to organize the empowerment of schooling community via Dental Immunization.

Weaknesses

- No one is interested in the empowerment in schooling community via Dental Immunization based on their past experience with empowerment.

Opportunities

- It can motivate Districts/Townships that, based on Basic Health Research (BHR), have the worst dental health in order to accept the empowerment in schooling community via Dental Immunization

Threats

- Dental health program is not a priority.

Dental Nurse School

Strengths

- It can implement empowerment in the schooling community via the Dental Immunization program.
- Dental care students can enroll in the training for empowerment in the schooling community via Dental Immunization.
- Empowerment in the schooling community program via Dental Immunization is still within the non-invasive corridor which is the authority of dental care.

Weaknesses

- There is no direction from the top management regarding the empowerment in schooling community via the Dental Immunization program.

Opportunities

- To make dental care students aware of the empowerment in schooling community via the Dental Immunization program.
- Empowerment in the schooling community via Dental Immunization can become a new field of work for dental care workers in schools (cross-programs/cross sector negotiations are needed)

Threats

- There is no personnel allocation for nursing graduates to do the empowerment in schooling community via the Dental Immunization program.

Faculty of Dentistry

Strengths

- Empowerment in the schooling community via Dental Immunization can be accommodated in the community health laboratory.
- It can be the actual field for the interaction between students and the schooling community.

Weaknesses

- There is not any socialization about empowerment in the schooling community via the Dental Immunization program yet.
- Difficult and takes time to change the curriculum.

Opportunities

- Make dentist candidates aware of empowerment in the schooling community via the Dental Immunization program.

Threats

- It has no ability yet to convince them of the necessity of empowering schooling community in the form of the Dental Immunization program.
- It is not easy to accept change.

School Principals

Strengths

- They have the authority to organize Dental Immunization.
- They can provide necessary facilities.
- School's operational budget is available (although it is limited).
- They have the charm to influence students/parents.

Weaknesses

- They think vertically.
- They are uncomfortable in accepting new ideas.
- New ideas create conflicts according to logical thinking; they are reluctant to try to replace old ideas.
- They prefer stability because it does not require sacrifice.

Opportunities

- They are sufficiently educated to incorporate new ideas after receiving appropriate explanations.
- They can be instructed by their “super body” (ie, they need to be contacted first by their “superior”)

Threats

- They are afraid to receive donations from the community as they are afraid to be accused of corruption.

Dentist/Dental Nurse as Dental Immunization Organizer

Strengths

- They are competent doing their tasks.
- They are close with the school community.
- There is a grade system for job promotion based on the activities being done.
- They follow their superior’s instruction (Health district office/dentist association).

Weaknesses

- Being comfortable with the present condition, they cannot find the reason to do extra work, especially with no increase in salary.
- Without motivation, they tend to work haphazardly.
- They tend to make fake reports in order to “make the boss happy.”

Opportunities

- They can still be motivated with rewards/study opportunities/invitation to attend symposiums.

Threats

- Transfer/ rotation to other places.

Parents

Strengths

- They love their children so they tend to do anything that is considered good for them.
- They have income to pay.

Weaknesses

- They are hard to be taught as they have a fixed way of life.
- They tend to forget their commitments.
- They feel that education is solely the teachers' task.
- They are reluctant to participate.

Opportunities

- They can be motivated through their child's best interest, thus getting involved in the Dental Immunization program.

Threats

- They are easily affected by negative rumors against the Dental Immunization program (such as, the program will hurt the children).

In brief, the essence of strengths, weaknesses, opportunities, and threats depends on their Vertical and Lateral thinking (Edward deBono).

Empowerment

How many times would you teach a child until he can ride a bike?

Empowerment is a similar process.

Empowerment does not happen in one or two meetings.

It is an ongoing necessary assistance until your community “can ride their bikes.”



Figure 36. A simple question thrown to the 61 headmasters in Bontang, “Who wants to take part in this program using your own budget?” And all of them answered by raising their hands.

What is the easiest sign that empowerment has happened?

These are touching stories from all over.

They Own and Lead the Program

One small Muslim kindergarten in Kubu Raya, Kalimantan, has received the Dental Immunization program. The headmaster was so happy with this program, and a clear sign for her was that the program increased the number of students applying to her school. She was proud that now parents from the military even chose to put their children in her school. Mrs. Suryati did not keep the success for herself; she decided to spread the

good news to other schools. So, she invited 90 schools in West Kalimantan, through their own funding (no sponsorship). Each participant paid USD 5.00 just for the meeting room and a simple lunch. They came from all over Kalimantan on their own expense, traveling for many hours, to learn how to be a healthy school through the Dental Immunization program. Provincial health district listened to this headmaster and even opened the seminar. The chief of the health district came to give support which was needed for a paternalistic country like this. But, the lesson learned was, every small effort matters. When you move with true spirit, everybody just lends their hands. It was so touching.



Figure 37. Mrs. Suryati invited 90 schools in West Kalimantan, through their own funding.

So, we flew there as speakers, and the teachers decided to welcome me with Chinese dances. This program has able to erase all boundaries and made us think as one: how to keep my children healthy so they can achieve all their dreams.



Figure 38. Chinese dances erased all boundaries and made us think as one: how to keep my children healthy.

They Fund and Run the Program

This has happened in 179 schools, involving more than 15,000 children. Now they are no longer waiting for budgets, but they can hand-in-hand collect the money to keep the program sustained and running. In average, most schools decided on a range of USD 0.50 up to USD 1.00 per child per month.

Another school in the small island decided to find money to run the program by selling coconut.

Be not afraid of growing slowly, be afraid of standing still.

They become creative and build each other with many ideas

Remember the Bottle Milk graduation? If you expect when you visit the school, you will see a bunch of rotten bottles, you will be disappointed. Because, now the bottles have changed their appearance. They have become bees, cars, airplanes, trains, lamps, anything.



Figure 38-2. Bottle milk graduation at Nurul Muslimin Kindergarten, Kubu raya. One child will surrender her bottle that has been designed into bees.

One school decided to apply Remineralization therapy every morning in school after the children brush their teeth. Their consideration is, if the remineralization therapy is applied at home, most probably parents will forget.

Another school applied a “reward” for children who have been surface protected. The teacher will take them to the shopping mall to enjoy playing in the kids’ amusement center.

MASTERING THE DENTAL IMMUNIZATION IMPLEMENTATION

Dental Immunization in the School Setting

Who am I?

Start with identifying yourself:

1. Are you in the position of making decisions in the health sector?
2. Are you the dentist/dental nurse yourself?

Identifying Stakeholders

Whoever you are, the next step is to team up and complete the stakeholders. You will need the following in your team:

1. A person who has the authority and can decide to run this
2. A dentist/dental nurse who will do the field work
3. The community you are aiming to empower (school/kindergarten); if it is an institution, then you need the decision maker (the principal/the head of school foundation) on board your team

Team Selection

Search for the “player type” in completing your team.



Figure 39. Mrs. Mulyathi and staff work together with Dr. Haryagung to prepare the International school oral health event.

Players are everything. They are the most precious friends you have.

Strategies to find the players:

1. Never appoint a school or a person; the most common mistake usually made as a decision maker is to tend to appoint people.
2. Make the searching process as if it were a competition, like a “World Idol” competition. Then people struggle to prove that they are worthy to be in your team; so, that the decision to join you is made by themselves.
3. Make it “limited seating” or “limited offer.”
4. When you want to conduct training, do not invite people, rather select people. If you have budget to train 20 of your staff, make them compete as if the seating is only for five. Empower them by letting them make the decision that this is the training program they wanted, not because they were appointed.
5. Make it a “precious and honorable opportunity” to be part of this program. A mistake is to take the oral health program for granted and not “respect” our own program. Most of the time we advocate and quit because we are also not certain whether we are approaching it correctly, and sometimes we do not believe in the program we are going to “sell.” If you cannot “sing” it yourself, find a great “singer” to sing on your behalf. The same song, sung by a different person, will give a different result.

The beginning is difficult. So it is normal if you feel you are facing many challenges. You are on the right track.

Mastering the Knowledge

After successfully forming the team consisting of players, these are the next steps and can be done in parallel:

1. Dentists/dental nurses, as field executors, need to attend the Dental Immunization training and master all the theory and technique.



Figure 40. Fun training, enjoyed by all participants.

2. Socialization and advocacy to all stakeholders.
3. If aiming for the school community, then you need to gather parents at a meeting to advocate to them about the program.

Now you are all set.

Activity Planning

Remember, to “start small and experience success” is better than to start big and fail. When my five-year-old son started doing jigsaw puzzles, I did not suddenly buy him a 1,000-piece puzzle. I bought a smaller number of pieces, and he was happy to get the jigsaw completed. Afterwards I bought him a bigger puzzle, and he confidently succeeded at it.



Figure 41. Jigsaw approach, “start small and experience success,” is better than to start big and fail.

If you are the dentist/dental nurse and you have planned to work in the school setting, calculate your ability and start with what you are capable of in terms of time and energy. Normally, handling 600 children, you need to spend two days a week at that school. So, if you have one day a week dedicated for the school, you can handle 300 children in a year. If you only have one day a month to do this program, then you can handle 75 children.

If you are in a higher level and would like to plan for your area, then one dentist/dental nurse can handle 75 children with only one visit per month at one school.

Data Base Survey

Do a survey for elementary school grade 1, or less, using the survey form in the Appendix. The survey form is different from others because we record white spots to be able to provide preventive action. When you do the survey on the children, take many photos showing the condition of their teeth. Use these “real condition” photos when you give lectures at parents’ meetings. Calculate the average of decayed teeth per child in that class.

Advocating to the Parents

Prepare for the parents meeting. Who should invite them? The principal of the school. When is the perfect event to have all the parents coming? Ask the principal if they can give you 45 minutes to speak as an addition to that event. Presenting to the parents is very important, as they are the decision makers for their children.

What should you speak on in the parents' meeting?

1. Feedback on the severity of caries disease (use real case pictures from that specific place). Stress the average decayed teeth per child in their surroundings. For example, in several parts of Indonesia, it was eight teeth per child (six-year-old children).
2. Show the impact of decayed teeth on growth, brain development, anemia, school presence, and any future job that they might not enter due to decay in permanent teeth.
3. Ask them have they ever experienced one tooth decaying? How did it feel? Can you imagine how it feels when your child has eight decays? Can they eat well? What will happen if they cannot eat well? How about their brain development, which needs good nutrition? Wait until they answer your questions.



Figure 42. Severity of caries disease; imagine how it feels.

1. Ask them who will sing or read a poem confidently in front of the class, the child with decay like in the picture below or a child with good, healthy teeth? Do you know how low self-esteem will impact a child's psychological development? Who will shine brighter, a child with self-confidence or a child with lack of confidence?



Figure 43. Severity of caries disease causes lack of confidence.

2. Explain the mechanics of how a tooth becomes decayed and how to prevent it.
3. Make it a two-way communication. Involve them to take responsibility of their child's condition. The usual mistake is to make it one-way advice and think we are cleverer, so that they just need to listen and do what we say.
4. For parents, education is most important for their children. In the way you deliver, tie dental health to education.

Budgeting

After you gain strong commitment and demand that this program is urgent to be run, now you can discuss the budget and distribution of roles/responsibilities.

Basically this is what you need, and this is an example of a budget model:

Table 16. Budget model.

	PIC / Role
Laptop, printer, papers	Ask the school if they can provide this, if not, use Irene donut manual version
Tooth brushing supervisor	Make schedule for parents so each of them responsible of supervising tooth brushing activity in the school. 2 parents for 20 students, once a week, for example.
Surface protection, dental instruments, GC Tri plaque id gel™	1 child @ US\$ 0.50 / month (for every 200 children) : ask parents if they can collect and organize the money among themselves
Remineralization therapy	Parents / school
Manpower, honorarium, time allocation	Dentist/ dental nurse/ school oral health worker/ government

Stop here. Observe their reaction. USD 0.50 is equal to pay one hour of parking in Jakarta. Find out what USD 0.50 equals in this area. Is it the price for cigarettes? Find something that relates directly to the parents.

If they react by saying, “Oh this is too expensive” or “we do not have the budget,” it is a sign that you have not delivered the story effectively.

Do they own a motorbike or even a car? Are these expensive compared to this program? Why did they buy it? Because they needed it, right? So if someone does not buy your idea, it means that when you delivered your story, you did not touch their need. Rephrase your story.

One day I visited a remote area in Kalimantan, and I asked the headmaster about how he ran the Dental Immunization program. He explained that parents pay USD 0.50 per month. The social economy in the neighborhood was very low. As an example, they paid USD 5.00 for the school fee per month. So I asked, “Does it burden the parents?”

He explained, “I said to the mothers, everyday you go to the market and buy some vegetables. Sometimes you receive change USD 0.05 after you shop. Keep that small change everyday. After 30 days, how much you have? $USD\ 0.05 \times 30\ days = USD\ 1.50$. It is already enough for 3 months.”

You can always look for money. Never use limitation of money as an excuse not to run a program.

Start Dental Immunization Activities

For all steps in Dental Immunization, you should start with giving “feedback” using Irene Donut software/manual. It is tempting for health practitioners to skip this step, because they have never been trained to do “prevention” and are used to going straight to the curative approach. Experience shows that those who skipped this process gained lower commitment and lower ownership compared to the group who started with the Irene Donut program. Why? Because when you do Irene Donut assessment, you engage the parent and the child. People like to be engaged, because then you show them respect and appreciation by listening to them, and valuing their perspectives.



Figure 44. Dr. Putu Judy running the software with parent and child in the school.

Irene Donut software can be freely downloaded from www.irenedonut.com and used offline.

Not only parents, but also 3rd year elementary school children who can operate Irene Donut software directly, are very excited about this tool.



Figure 45. Students from SD Saraswati 5, Denpasar, looking very excited.

Communicating to Patients

In everything we do, try to involve the patients. Before we do the survey, surface protection, etc, try to communicate that to the patient/child. Take a picture of the child's mouth using your smartphone and show it to her, so she can see and understand what you will do. Ask her which tooth is good and which is not good. Ask her whether she would like to make the bad tooth look good like the others. Let her make the best decision for herself.

Use GC Tri plaque ID gel™ as a tool to communicate to the patients about their oral hygiene and tooth-brushing skill.



Figure 45-2. Explaining the child's tooth condition is very easy using her real photo. Maximize your smartphone.

Help the Patients

Think what you can do to help the patients. Can we do any restorations to improve their appearance?

Understand that rampant caries can be treated using glass ionomer cement with the ART method. And understand that GIC has evolved so that now the color is closer to the teeth.



Figure 45-3. Before and after images. Rampant caries filled with GIC Fuji IX Capsules Extra within three minutes.

Why is doing this important? When you already know that the children are suffering from rampant caries, giving only oral health education is “not helping.” Once we do simple restorations, parents and children appreciate it so much, and they trust that we are really thinking of them. Next time, they will listen.

If you cannot do great things, do small things with great love -Mother Teresa

Summary

I realize my hands are only two so I would not be able to do everything myself. So, I give a strong, impactful story that will move the community. I usually asked the headmasters to do these things without waiting for health personnel:

1. Buy Tri Plaque ID gel
2. Conduct tooth brushing activity supervised by mothers
3. Download Irene Donut software
4. Run the software, print the report
5. Do the advices given and record using the checklist
6. Do remineralization therapy if necessary
7. Organize parents' meeting (can be several schools together)

These 7 commitments I usually already achieve in first presentation with the headmasters, if I do the “team selection” correctly. The presentation with the headmasters usually takes 1-2 hours.

If you cannot sing it yourself, bring a singer.

If the community can do by themselves these 6 items, we can concentrate our limited energy to do other things

Life Lessons from Health District Bontang East Kalimantan

During the 7th Asian Conference of Oral Health Promotion for School Children 2013, one of the themes was “Empowering School Community.” Delegates from Bontang proceeded directly and adopted it in their place. Below is their story and experience in implementing the Dental Immunization program.



Figure 46. Bontang team, unsung heroes.

Bontang is a city in East Kalimantan with area 49.757 km² and 163,326 people living in the area. The size of Bontang is a bit larger than Switzerland. Bontang is the richest city in Indonesia because of many big companies there: gas, oil, coal mining. In this city, every health treatment is free and fully covered by local government. Conventional school oral health services have been carried out for many years, but oral health survey 2014 showed that at elementary school students grade one, caries free was 4.9%, and dft 7.7, meaning in average each child had 7 decays in their mouth. 55.2% children had more than 7 decays in their mouth, and 36.6% children had decay in permanent teeth. And this is 6-year-old children we are talking about.

All of this time, School oral health activity only covered screening of students' oral health and referred them to nearest health center. But, over the last decade this activity did not show any improvement in oral health. No follow up was taken after students were screened for their oral health.

The initiator of implementing this new Dental Immunization program is Regency Health District, under Ms. Jamila Suyuthi. She is not a dentist, but a public health officer with concern for oral health. Advocating to Bontang's headmasters has been seen as greatest challenge by the health district. This is because, everything there was free, and we were offering a program which need them to pay from their pocket.

Surprisingly for the Health district, at the end of the day, we got many schools signed up for the program and willing to fund the activity. Then the Health district, together with Local Ministry of Education, signed an MOU on their readiness to collaborate and give any necessary support.

We started with three days training for the health personnel, including assistance in the field setting and practice. And then three months later, we made a second visit and followed up on their progress.

Result of the progress:

1. All elementary schools in Bontang city committed to run the Dental Immunization program.
2. Health center and its dentists were receiving requests from the schools to assist them.
3. Ministry of Education and Health district together make a work structure to support the activities.
4. In the schools, there are several parents who are very poor and cannot contribute money for this program.

Way to go forward:

1. Include dentists in hospitals and private clinics to actively participate in supporting this program.

Conclusions:

1. Empowerment is a must. If we have to choose between empowerment or universal coverage like insurance, it will be beneficial if there is community empowerment. Because universal coverage insurance is from the government and very much relies on government, so sustainability is questionable.
2. Dental Immunization program needs community participation. There are areas where it is difficult to be reached by health personnel, for example at home or school. So for these untapped areas, with this program, community can take care themselves to some extent.
3. Advocacy should be done again and again at upper level because regulation of MOH cannot stand alone but needs reinforcement from other ministries such as ministry of education, parents, and schools.

Team of Bontang Health personnel:

Head of Health centers, Jamila Suyuthi, SKM, Zennidar Aulia Nashira, SKM, Dr. Erwin Wahyudiono, Dr. Safitri Kusuma Dewi, Gones Susanti, Dr. Eva Septiani, Dr. Dewi Arsih, Dr. Indra Sulistia, Herwani, Muchlis, AMKG, Dr. Winda Futriani, Dr. Orbadewo Saktinegara, Rusnaeni, Andi Indrayanti, AMKG, Dr. Faradina, Dr. Muhammad Arif, Dr. Nur Rahmah, Welly Sinaga, Dr. Eka Meibonitasari, Zahroh Dini, Sundaria, Dr. Oktarina Zakiyati, Indra Ferdian, AMKG, Dr. Nonik Oktaritha, Dr. Haryani Uddin, Hasmiah, AMKG, Oktaviani Juwita Asih, A.Md. Kep



Figure 46-2. Dr. Eva and her team conducting surface protection.

APPENDIX

Training Modules

Training of the Dental Immunization Irene Donut pilot model of the Ministry of Health of the Republic of Indonesia, held in October 2012 in Denpasar, Bali, is considered successful, as it has created a solid Dental Immunization Organizer Team. To achieve such result, it needs serious efforts in the training of the Dental Immunization Irene Donut. Based on experience, it requires five days intensive training to create bonding between the organizers. The training was not only in terms of dental technology and practice, but also involved spiritual and mental building as well.

A. TRAINING MATERIAL

The list shown below is an example of activities in the training:

- Registration is required to know the number of training participants
- The opening speech, especially from the Director of Health Care Effort, is to ensure that the program gets the attention and will be supervised by government institution
- The status of Dental and Oral Health in Indonesia reveals the dental health condition based on Basic Health Research 2007 (it is important to note that the survey result on caries status is under-scored. This due to the fact that the results are based only on visual signs. In an iceberg phenomenon, what is seen on the surface is D3, whereas the real process happens under the surface)
- Pre-test. This is to evaluate the depth of the participants' understanding of Dental Immunization. The pre-test results would become the

reference for deciding the issues to be emphasized during the training. It would also be used as an evaluation tool about any improvement on knowledge and skill after conducting a post-test

- Ice breaking is for creating a supporting situation, for strengthening the intentions to run the Dental Immunization program. It uses, among others, “Four-Squares” to show the way of thinking that dominates self-motivation. The commitment to success is to encourage participants not only to listen, but also to own a high level of commitment towards Dental Immunization. There are six learning steps that tell on what level participants should decide their level of participation
- The revitalization of SOHS shows the why and the how concerning the operation of Dental Immunization
- Risk assessment using Irene Donut is an advocacy approach using the previously described FRAMES principles (followed by try-out)
- The theory behind Irene’s Donut shows the background as the basis for creating the Irene Donut software, a holistic approach to all caries risk factors
- Remineralization therapy, that has become the recommendation of FDI (World Dental Federation), is to be applied in the context of Minimum Intervention Dentistry, changing the old theory that that caries process is only one-way and incurable (followed by field practice)
- Surface protection is the latest approach that cuts caries process in advance by maturing a newly erupted tooth enamel which is vulnerable to acid as it still has a high level of carbonate content (followed by field practice)

- ART is a part of Minimum Intervention Dentistry that should be applied with Dental Immunization
- Recording and reporting, so the collected data can be beneficial for the planning and correction of the on-going program (followed by field practice)

Creating a work plan

Aside from theory, field practice is also conducted, to make training participants not only aware, but also able to put theory into practice

A. TRAINING SCHEDULE

Example of training schedule is as shown below.

Table 17 Training schedule of innovative SOHS Irene Donut pilot model- Ministry of Health, RI–Denpasar Bali October 2012

Day/ Date	Time	Agenda	Person in charge
Monday 1-10-12	16.00-18.00	Registration	Committee
	19.00-19.30	Opening Speech from Director of Basic Health Care Development	MOH
	19.30-21.00	Oral Health Status in Indonesia	MOH
	21.00	Break	
Tuesday 2-10-12	8.15-8.45	Pre-test	Committee
	8.45-9.30	Ice breaking / brainstorming Square 4 Success commitment learning steps 6 Looking for a partner	Irene
	9.30-10.15	SOHS revitalization – Dental Immu- nization	Andreas
	10.15-10.30	Coffee break	
	10.30-11.15	Risk assessment	Irene
	11.15-12.00	Remineralization therapy	Irene
	12.00-13.00	Break and lunch	
	13.00-13.45	Risk assessment try-out	Irene
	13.45-14.30	Surface protection	Irene
	14.30-15.15	Surface protection try-out	Irene

Day/ Date	Time	Agenda	Person in charge
	15.15-16.00	Question and answer Post-test	
Wednes- day 3-10-12	8.15-8.45	Irene Donut	Irene
	8.45-9.30	Theory behind Irene Donut	Irene
	9.30-10.15	Irene Donut individual practice	Irene
	10.15-10.30	Coffee break	
	10.30-11.15	Irene Donut group practice	Irene
	11.15-12.00	Group presentation	Organizer
	12.00-13.00	Break and lunch	
	13.00-13.45	Signature game	Organizer / Committee
	13.45-14.30	Report presentation /calibration	Andreas
	14.30-15.00	Recording and reporting - theory	Andreas
	15.00-16.00	Recording and reporting – practice in laptop	Andreas
Thursday 4-10-12	7.30-8.00	School visit	Committee
	8.30-12.00	Irene’s Donut and surface protection practice	
	12.30-13.00	Back to hotel	
	13.00-14.00	Break and Lunch	
	14.00-14.45	SMART restoration theory	Organizer
	14.45-15.00	Helium stick game	
	15.00-16.00	Working plan and group presenta- tion	Irene
Friday 5-10-12	8.00-8.30	Post-test	Andreas
	8.30-9.15	Analysis on recording result	Andreas

Day/ Date	Time	Agenda	Person in charge
	9.15-10.00	Wrap up	Andreas
	10.00-10.30	Closing	Committee



Fig 46-3 In memoriam Dr Sudono and Dr Dewi Kartini Sari, as Ministry of Health who had initiated the training

A. MATERIAL EVALUATION OF DENTAL IMMUNIZATION TRAINING IN THE MEDICAL POLYTECHNIC DENTAL HEALTH DEPARTMENT, (Dental Nurse School J- SEMARANG – 2009)

Training Material:

- The material provided was something new for me (91% new matter)
- The material provided was something useful for me (100% useful)
- The material provided was something useful to improve my skill (100% useful to improve the skill)
- The complexity of the material provided was low (68% answered “not complex”)

DELIVERY METHOD

- The materials were delivered in an interesting manner (100%)
- The systematics of the material made it easy for me to understand (95%)
- The facilitator was able to motivate an interactive discussion (100%)
- Every participant was given a chance to actively participate in this session (100%)
- The time for discussion was adequate to improve one's learning ability and skill (91%)

MEDIA

- The primary materials complemented the learning process (100%)
- Additional materials enriched my insights (100%)
- Supporting media, such as LCD and loud speaker, helped the learning process (95%)
- The training room is comfortable to study (91%)
- Other facilities are very helpful (100%)

COMMITMENT AFTER TRAINING

- Will immediately apply the knowledge and skill as the program is in line with my job (91%)
- Will share this experience with another colleague (91%)

TRANSFER CAPABILITY

We measured the transfer capability of dental nurse students. The capability to transfer the material objectively can be seen on the results of pre-test and post-test as follows:

There are 17 questions. Score is from 0-100. Pre Test was done before training. Post test was done after 5 days training.

Table 18 Pretest and posttest result

	Lowest score	Highest score	Average
Pre Test	6	56	39
Post Test	33	88	74

It was clearly seen that the education materials is new for many attendants and something they probably never received in dental school.

Source: Evaluation of training materials by participants – reported by Amila Megraeni. SE, Mba, Center for Health Administration and Policy Studies, University of Indonesia-2009

Standard Operating Procedures

To disseminate Dental Immunization, it should be inserted in the curriculum of educational institution such as Dental Health Department in the Medical Polytechnic (Dental Nurse School), or Faculty of Dentistry. Therefore, when the students graduate as dentists or dental nurses, they have already had exposure to Dental Immunization and are ready to be posted in Community Health Centers (CHS) or other places.

These standard operating procedures although written for educational institutions can be modified according to the need (for example in dental clinics or directly working in the field).

A. STANDARD OPERATING PROCEDURE (SOP) OF THE INNOVATIVE SCHOOL DENTAL HEALTH SERVICES PROGRAM

Term

The Dental Immunization is the updated version of the ‘traditional’ SOHS, which is modified by the application of inventions based on doctoral dissertation of Irene Adyatmaka DDS PHD; in particular, the caries risks free simulator software program. It involves the community, science and technology relating to the latest caries theory, specifically in relation demineralization vs. remineralization and “Minimum Intervention Dentistry” treatment principles, especially to protect vulnerable teeth (surface protection), as well as the earliest possible intervention with added value, in the sense that it is more effective and measurable.

Objectives

Long term: To achieve an optimum status of dental health in kindergarten and elementary school students through professional service and the parents' active participation.

Short Term: To have schools accept the Dental Immunization program, along with the implementation of survey, Irene Donut motivation interview, remineralization therapy, surface protection, ART for students according to needs.

Policy

To foster the students' skill in organizing Dental Immunization.

Achievement Criteria

The ability to approach school principals, to explain the Dental Immunization program, to conduct Dental Immunization survey and to conduct motivational interviewing with parents using Irene Donut program either manual or computerized version, to do remineralization therapy, surface protection ART, to input data to software program namely survey, daily action record, Irene Donut, caries risk simulator sheet.

Dental Immunization Procedure: is a set of activities of which each one has separate SOP.

Facility / Tools / Material in General

The facilities for presentation / communication: computer / notebook; LCD projector; screen; printer; loud speaker; height / weight measuring apparatus; tools for survey / surface protection (ART set instruments); transportation facility.

Materials for Irene Donut software examination; pH inspection tools in biofilm; materials for remineralization therapy (CPP-ACP); materials for surface protection (GIC prevention and stabilization material); survey inspection printed cards; caries risk sheet card; Excel software program to input data.

General Procedures

- Carry out approaches to school principals/ schooling community
- Conduct Dental Immunization survey; Input data to the related Excel program
- Conduct group /individual motivation interviewing to all parents / selected parents of Kindergarten / 1st grade students to ascertain risk factors of Kindergarten /1st grade population. Conduct discussions according to program recommendations and parents' approved home assignment
- Conduct fissure protection to all erupting / having pits /black fissure teeth (if possible). If not, then do it to selected children with serious condition, with Irene Donut risk indication of 80% or more, with caries on seven or more deciduous teeth or with caries on permanent teeth
- Input the data to related Excel program
- Compile data for report / research analysis create community health program conduct program (for lecturer/ researcher)

B. SOP FOR THE EVALUATION OF CARIES RISK “IRENE DONUT” (computerized version)

Definition

Caries Risk Simulator (Irene donut) is an interactive program in the form of computer software. By filling-up the risk factors related to children's

behavior, children's dental health condition, mother and child's condition / environment, knowledge, attitude and mother's behavior (the child's parent), the program will show a rough illustration of a child's risk vis-à-vis the possibility of dental caries.

The program also offers a "menu" on what parents / children might do to reduce the caries risk. It can be brought home as the guideline to continue the dental treatment.

Objective

1. To provide an understanding about caries risk factors as early as possible
2. To provide an understanding about how to prevent caries
3. To provide a visual illustration of the level of caries risk and the possibilities to fix them
4. To empower parents (schooling community) for maintaining the children's dental health.

Policy

To teach skills to college students to do evaluations on caries risk.

Achievement Criteria

The smoothness of the procedure, the success on giving assignments in the form of monitoring sheets of anticipative efforts (report) and the parents' commitment.

Procedure

INDICATION

1. To be presented to kindergarten/ 1st grade students' parents at the beginning of academic year as introduction to the Dental Immunization program
2. To motivate parents' participation individually (or in groups of five) on children with serious caries condition (for example, five per cent of the children with worst conditions or with the condition that any of their permanent teeth have caries, or with seven or more of their deciduous teeth have caries). Basically, the parents' role relating to the dental health of their kindergarten / 1st grade elementary school children is very important.

INSTRUMENT OF CARIES RISK SIMULATOR

- Computer / laptop
- Colored printer
- Caries Risk Simulator Irene Donut computer software
- Status of children's dental health examination forms
- Print out of children's reports
- pH inspection tools in biofilm
- Mouth mirror

OPERATIONAL PROCEDURES

Preparation

1. Tabulate the 1st grade students' teeth inspection results
2. Prepare caries risk simulator instrument
3. Specifically, for indication No. 2: select a child with "severe" condition (he / she who has caries on his permanent teeth, or has seven or more caries on their deciduous teeth).

Implementation

For individual / group of five mother's consultation:

1. Mother, child and the operator sit facing a computer/ laptop
2. The consultation using the computerized version of Irene Donut is responded positively by the child and his / her parent
3. Run the program and do what is asked by the program by filling in the necessary data
4. Take a plaque sample for examining its acidity level (see the procedure and guideline of biofilm inspection)
5. Ask every question shown in the program
6. When examining white spot / black fissure, ask the mother to see her child's dental condition (see the procedure and examination guideline of AAPB)
7. When all have been completed, show the illustration of caries risk level
8. Offer anticipatory actions (menu) that can be done and show the changes on the risk
9. On the interview result, show what can be done as home assignment.

Conclusion

1. Take note/ compile the results of Caries Risk Simulator Irene Donut checklist (factors that occurs simultaneously, factors that could be anticipated, and the risk level before and after the anticipatory actions)
2. Do surface protection / remineralization therapy (in school or other place as per capability requirements)
3. Do evaluation on completed home assignments and analyze their level of success
4. Do discussion to increase the parents' participation in their children's dental health.

C. SOP OF THE EVALUATION OF CARIES RISK IRENE DONUT (manual version)

Definition

Caries Risk Simulator (Irene Donut) is an interactive program in the form of a manual activity program. By filling-up the risk factors related to children's behavior, children's dental health condition, mother and child's condition/ environment, knowledge, attitude and mother's behavior (the child's parent), the program will show a rough illustration of a child's risk which means the possibility of having decayed teeth if the child maintain the habit as usual. The program also offers "menu" on what parents/ children might do to reduce the caries risk. It can be brought home as the guideline to continue the dental treatment.

Objective

1. To give an understanding about caries risk factors as early possible
2. To give an understanding about how to prevent caries
3. To give visual illustration on the level of caries risks are and possibilities to fix them
4. To empower parents (school community) for maintaining the children's dental health treatment.

Policy

To teach skills to college students to do evaluations on caries risk.

Achievement Criteria

The smoothness of the procedure, the success on giving assignments in the form of monitoring sheets of anticipative efforts (report) and the parents' commitment.

Procedure

INDICATION

1. To be presented to kindergarten / 1st grade students' parents at the beginning of academic year as introduction to the Dental Immunization program
2. To motivate parents' participation individually (or in groups of five) on children with serious caries condition (for example, five per cent of the children with worst conditions or with the condition that any of their permanent teeth have caries, or with seven or more of their deciduous teeth have caries). Basically, the parents' role relating to the dental health of their kindergarten / 1st grade elementary school children is very important.

INSTRUMENT OF CARIES RISK SIMULATOR

- Flipchart / Caries Risk Simulator “Irene Donut” manual booklet
- Status of children’s dental health examination forms
- Work sheet/ dental report
- Mouth mirror

OPERATIONAL PROCEDURES

Preparation

1. Tabulate the 1st grade students’ teeth inspection results
2. Prepare caries risk simulator instrument / writing instrument
3. Select a child with “severe” condition (he / she who has caries on his permanent teeth, or has seven or more caries on his deciduous teeth).

Implementation

For mass consultation

1. Gather the parents in one room
2. Distribute Caries Risk Simulator Irene Donut booklet and work sheet (report) to parents who participate in the evaluation (assignment)
3. Explain the procedure for filling in the work sheet
4. Guide them to answer the questions one-by-one, explain things they do not understand
5. Guide them to count the score and the percentage % value of caries risk, and to write them down on the column “before treatment”
6. Explain if the answer of the score = 1, that means “risk”

7. Ask them if they want to change every risk factor from score 1 to score 0, according to the recommendation written on every risk factor
8. Once again, add the scores on “CHANGE” column
9. Change the score to % risk
10. There is change of risks before and after the behavior changes
11. Give the monitoring sheet to parents for home assignment
12. Collect the examination result.

For individual / group of 5 mother’s consultation

1. Mother, child and the operator sit facing the flipchart / booklet
2. The consultation using the manual version of Irene donut is responded positively by the child and his / her parent
3. Open the flipchart / booklet of Caries Risk Simulator Irene Donut page-by-page and do what is asked by the program by filling in the necessary data
4. Fill in the appropriate column on the work sheet
5. Take a plaque sample for examining its acidity level (see the procedure and guideline of biofilm inspection); if no plaque pH available, choose the riskier situation
6. Ask every question shown in the program
7. When examining white spot / black fissure, ask the mother to see her child’s dental condition (see the procedure and examination guideline of AAPB)
8. When all have been completed, show the illustration of caries risk level
9. Offer anticipatory actions (menu) that can be done and show the changes on the risk

10. On the interview result, show what can be done as home assignment.

Conclusion

1. Take note / compile the results of the Caries Risk Simulator Irene Donut checklist (factors that occurs simultaneously, factors that could be anticipated and the risk level before and after the anticipatory actions)
2. Do surface protection / remineralization therapy (in school or other place as per capability requirements)
3. Do evaluation on completed home assignments and analyze their level of success
4. Do discussion to increase the parents' participation in their children's dental health.

D. SOP OF THE REMINERALIZATION THERAPY

Definition

Remineralization therapy is the administration of calcium-phosphate preparation for restoring calcium and phosphate content into demineralized teeth enamel. Demineralization means the loss of dental mineral during the caries process. With remineralization therapy, the caries process can be halted, and the mineral can even be restored.

Objectives

1. Preventing caries process by the administration of special calcium-phosphate supplements for maintaining positive and beneficial balance of demineralization-remineralization process
2. Healing initial caries process (white spot).

Policy

To teach skills to college students to do remineralization therapy.

Achievement Criteria

The smoothness of the procedure, the success on giving assignments for carrying out remineralization therapy and the parents' commitment.

Procedure

INDICATION

1. To be performed on teeth with white spot signs
2. To be used as the realization of Caries Risk Simulator “Irene Donut” recommendation
3. To be used on individuals with caries vulnerability (children with high caries risk, children with crowded teeth, patients with long-term medication, patients under orthodontics treatment, children with disability and elderly people).

PREPARATION MATERIAL

GC Tooth mousse containing Recaldent™ CPP-ACP (Casein PhosphoPeptide-Amorphous Calcium Phosphate nano-complexes).

OPERATIONAL PROCEDURES

Preparation

1. Separate children with high caries risk
2. Give explanation on the benefit and the method of application of CPP-ACP
3. Prepare CPP-ACP mousse.

Step-by-step procedures

1. Train the child / parents to apply CPP-ACP mousse on the surface of vulnerable teeth / white-spot
2. Apply mousse on the vulnerable teeth with a finger / toothbrush; use tongue to spread it evenly on the entire area of teeth surface
3. The remaining mousse can be spat out, but the child / patient cannot gargle for about 30 minutes to allow transfer of calcium-phosphate
4. Apply the mousse in the morning and / or evening after brushing teeth depending on caries risk severity.

E. SURFACE PROTECTION SOP

Term

Surface Protection is the application to occlusal surfaces using an adhesive filling material such as fluoride-rich glass ionomer cement to allow the maturation of dental enamel with the formation of acid-resistant fluorapatite bonds. Therefore, the enamel would remain protected despite the loss of coating.

Objectives

1. To mature the newly erupted enamel surface, which still contains lots of carbonate, to allow the maturation of dental enamel with the formation of acid-resistant fluorapatite bonds
2. To protect dental occlusal surfaces having caries prone black fissures with acid-resistant fluorapatite bonds.

Policy

To teach skills to college students to do surface protection treatment.

Achievement Criteria

The smoothness of the procedure, the success on enamel maturation / protection with GIC application and patient comfort.

Procedure

INDICATION

1. For newly erupted molars, especially on caries prone children / patients (as per the recommendation of Caries Risk Simulator)
2. For molars with fissures especially on children / patients who tend to have caries (as per the recommendation of Caries Risk Simulator).

CONTRAINDICATION

Not recommended for dental occlusal surfaces with shallow fissures caused by friction with its antagonist.

SURFACE PROTECTION INSTRUMENTS

GC Fuji 7 | Paper pad | Plastic spatula

- Mouth mirror
- Probe
- Tweezers
- Plastic instrument (applicator + trimmer)
- Cotton
- Bowl of clean water
- Vaseline

OPERATIONAL PROCEDURES

Preparation

1. Read the instructions for using high-viscosity GIC
2. Prepare Surface Protection instruments and other apparatus on the working table with adequate light.

Step-by-step procedures

1. Ask the child / patient to open his / her mouth
2. Clean the surface of the teeth that will be protected with cotton balls clamped by tweezers
3. Use dry cotton intermittently with wet cotton to rinse teeth
4. Do Step 3 at least twice or until dental occlusal is sufficiently clean from debris / plaque
5. Isolate teeth to be treated with cotton roll
6. Dry the occlusal surface with dry cotton ball, then apply conditioner for 20 seconds, rinse with wet cotton ball, and then dry with dry cotton ball
7. Mix one spoon of powder and one drop of liquid as instructed, apply the mixture evenly on the occlusal surface, including pits and fissures using plasticity instruments. Press using rubber-gloved fingers. Trim it with plasticity instrument and cover it using Vaseline / cocoa butter.

Finishing

1. Record the treatment in the form / dental health status of the child / patient
2. Instruct the child / patient not to eat / drink for one hour.

References

1. HC Ngo, J McIntyre and G. Mount. *Ion-Transfer patterns across a thin film of set glass-ionomer: Fuji 7*. Abstract 3058 - IADR, March 2005, Baltimore, Maryland, USA
2. SA Anthonson, J Wanuck, DE Anthonson. *At last, surface protection for newly erupting first molars*. Compendium, Vol 27, No 1, January 2006
3. RG Lindemeyer. *The use of glass ionomer sealants on newly erupting permanent molars*. JCDA, Vol 73, No 2 March 2007

F. CONTROLLING CROSS INFECTION

Sterilize all instruments after being used as per the prevailing regulations.

Survey Form

One of the important steps in the implementation of Dental Immunization is the survey. Its format is different from other surveys because it records the condition before caries happens, that is white spots and black fissures. This is because Dental Immunization has prevention as the orientation, such as curing the white spot and black fissure, so caries will not happen. Thus, the two symptoms should be contained in the survey form to be taken care immediately.

Term

The Dental Immunization Survey is a survey related to the Dental Immunization program. It is conducted at the beginning of academic year of kindergarten / Grade 1 of Elementary School to obtain preliminary data and at the end of academic year of Grade 1 for evaluation. The last data then would be used as preliminary data of the same students in Grade 2. At the end of academic year of Grade 2, a survey would be conducted for evaluation. The data then would be used as preliminary data of the same students in Grade 3. This will go on until the students get to Grade 6. The survey is done incrementally.

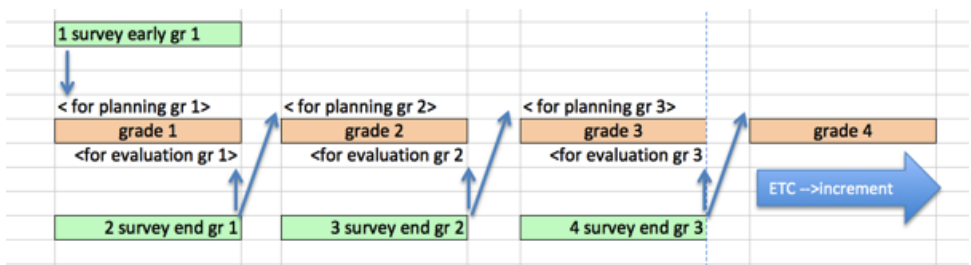


Fig. 47 Diagram: flow of survey for planning and evaluation needs by class

Objectives

- To obtain data
- To plan the Dental Immunization program
- To evaluate the success of the Dental Immunization program

Equipment :

- software / hard copy E- CHECK UP CARD-CARIES STATUS DENTAL IMMUNIZATION
- computer / laptop
- writing equipment.

EXAMPLE

A. E-CHECK UP CARD – CARIES STATUS DENTAL IMMUNIZATION

E-Checkup Card is integrated with Irene Donut evaluation. It is a program based on Excel.

It starts with Sheet “COVER.” Fill in the columns with identity / condition by changing the number on each row.

COVER FORM


	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	
1	E- CHECK UP CARD															 CHAMPS-FKMUI	
2	CARIES STATUS INNOVATIVE SOHS																
3																	
4																	
5	HEALTH CENTER	DENPASAR SELATAN 1								DISTRICTS	DENPASAR SELATAN						
6	CITY	DENPASAR								PROVINCE	BALI						
7	PERSON IN CHARGE	DRG. MADE ARTAYA								OPERATOR	PANDE PUTU PURWANIN						
8	SCHOOL	SDN 4 SESETAN								23-Oct-12							
9	GRADE	2	parallel					A	DATE	23	10	2012					
10	d m y																
11																	

Fig. 48 Cover sheet of E-check up card

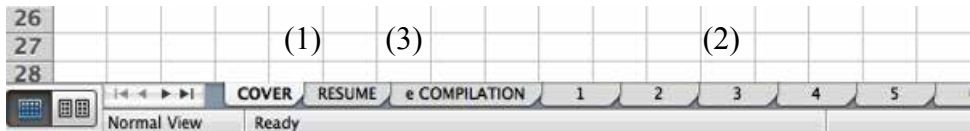


Fig. 49 Sheet of the workbook: (1) cover sheet, (2) individual sheet (1 to 50), (3) resume sheet and e-compilation sheet

Next, Individual Sheet one up to 50 is an Individual Check Up Card, it is integrated examination card as shown below. Automatically the identity is filled in as what is written on the sheet “COVER.”

After Individual Sheet “1” is completed, it will show the child’s condition: nutrient status (height and weight must be written down), caries risk before and after counseling.

INDIVIDUAL CHECK UP CARD



e-EXAMINATION CARD																	e- DONUT IRENE																
CARIES STATUS IN I-SHDS																	Fill in with numbers 1 when doing the Donut Irene consultation																
HEALTH CENTER DENPASAR SELATAN 1 CITY DENPASAR PERSON IN CHARGE DRG. MADE ARTAYATA SCHOOL SDN 4 SESETAN CHILD'S NAME PUTRI ANANTA JANENDRA AGE 7 MOTHER'S NAME PUTRI																	DISTRICT DENPASAR SELATAN PROVINCE BALI OPERATOR PANDE PUTU PURWANINGSIH DATE 23-Oct-12 SEX M GRADE 1 A height 115 weight 17																
55 54 53 52 51 61 62 63 64 65 S S S S S X S S S S																	QUESTIONS / RISK FACTORS 1 Does the child drink milk more than 1 time in 1 week? before YES after CHANGED 2 Does the child drink milk more than 3 times a day? 0 3 Does the child drink milk using bottle up to 4 years? 1 0 4 Does the child eat sweets every day? 0 5 Does the child like to sugar eat? 0 6 Is there any black fissures in the child's teeth? 0 7 Is there any white spot in the child's teeth? 1 0 8 Does the child's level of gums acidity below pH 5.7 (Yellow / red)? 1 0 9 Does the level of mother's education below level of the Academy? 0 10 Is mother's age 30 years and above? 0 11 Has the child brushed more than 2 year? 1 1 12 Is the child's age now 4 years and above? 1 1 13 Is the child taken care by their own family? (No babysitter) 1 0 14 Do you agree: Cavities DO NOT interfere with the child's growth and development? 1 0 15 Does the child brush her/his teeth without help? 1 0 16 Has the child cavities in their teeth? 0																
17 16 15 14 13 12 11 21 22 23 24 25 26 27 0 S 0 0 0 0 0 0 S 0 0 0 0 S 0																	when responder is willing to change the profile of the child, replace the number 1 in the column "After Donut" with the number 3																
47 46 45 44 43 42 41 31 32 33 34 35 36 37 0 S 0 0 0 0 S S S S 0 0 0 0 S 0																	BEFORE  AFTER 																
S sound 1 D1 caries at enamel R medical record/ x-rays F filled W whitening 2 D2 caries at dentine A abscess/fistula P prosthesis H black fissure 3 D3 caries involving pulp X extracted E erupting																	weight 17 KG ideal 21.04 status UNDER -24%																
bio film <input checked="" type="checkbox"/> X <input type="checkbox"/> GREEN																																	
devidentus s h w d1 d2 d3 r a f p 12 0 0 0 7 0 0 0 0 0 0 0 0 0 0 0																																	
PERMANENT S H W D1 D2 D3 R A M F P P 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0																																	

Fig. 50 : Interactive individual check up card

If the examination in the class is done, sheet “RESUME” will present statistic information of caries status and Donut Irene evaluation as one whole.

RESUME RESULT

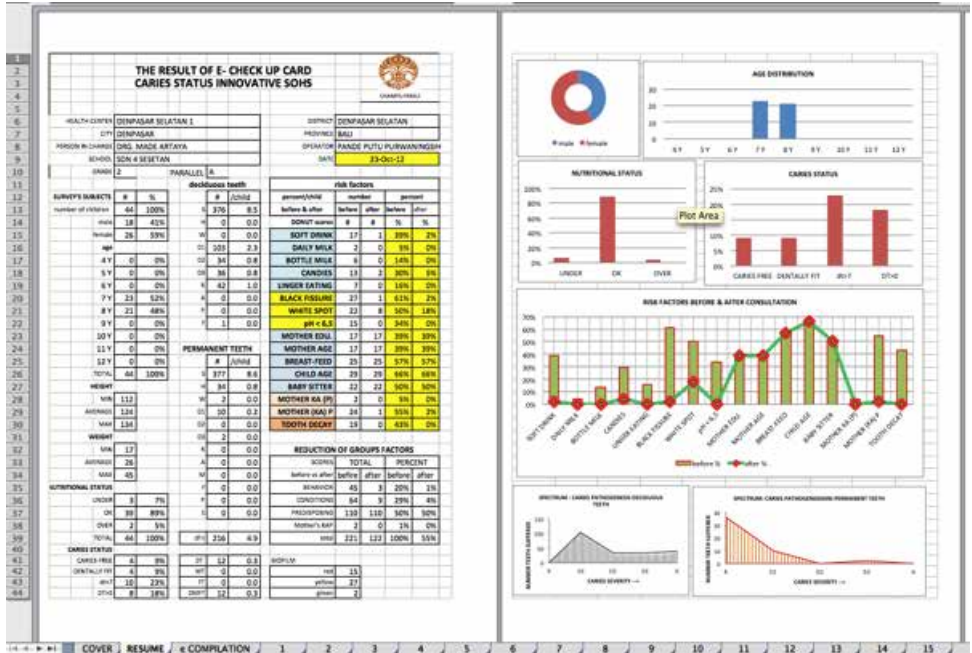


Fig. 51 Resume sheet: Statistic result of checkup cards

Sheet “e-COMPILATION” is compilation of whole data of the class. If compilation of all classes and all schools are needed written in one tabulation, “e-COMPILATION” can be copied and saved in a new workbook and then combined with another “e-COMPILATION”. The data then can be used according to the need.

B. E-INTERVENTION RECORD.

EXAMPLE: COVER INTERVENTION SHEET

Fill in with the identity of the institution.



	A	B	C	D	E	F	G	H	I
1									
2			PILOT MODEL INNOVATIVE SOHS "DONUT IRENE"						
3			PROVINCE			BALI			
4			CITY			DENPASAR			
5			DISTRICTS			DENPASAR TIMUR			
6			HEALTH CENTER			DENTIM II			
7			SCHOOL			SD SARASWATI 5			
8			PERSON IN CHARGE			DRG SINDURA			
9			OPERATOR 1			DRG YOHANA			
10			OPERATOR 2			D.A.WIDIASTUTI			
11									

Fig. 52: Cover sheet of intervention recording

INTERVENTION SHEET

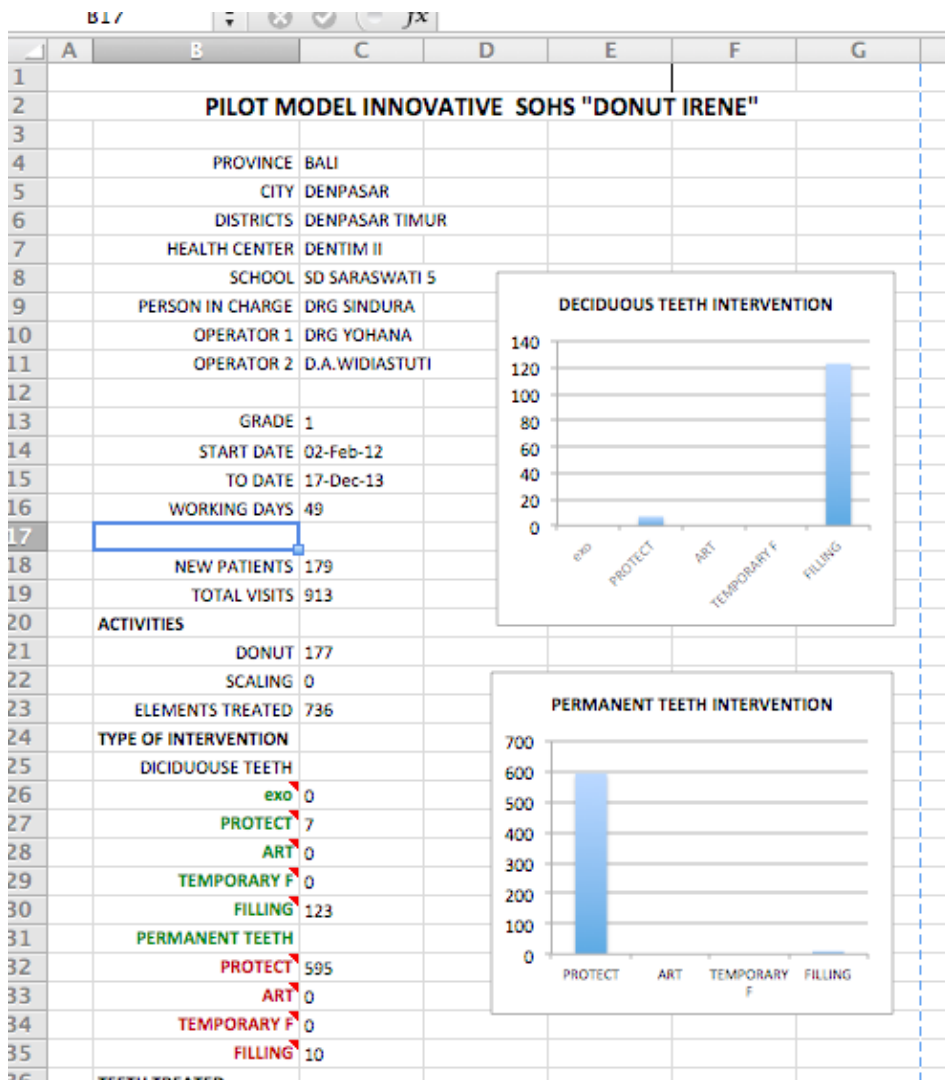
Fill in with every treatment given in every service.

No.	DAY	MONTH	YEAR	SCHOOL	CHILD'S NAME	GRADE	PRAR-LEL	No. Abs	NEW PATIENT	DONUT	SCALING	ELEMENT	PREVENT	PROTECT	ART	TEMPORARY I	PRELIMS	TEMPORARY II	FILEING		
													PREVENT	PROTECT	ART	TEMPORARY I	PRELIMS	TEMPORARY II	FILEING		
43	14	11	2012	SD S SARASWATI	BURHYA ANDRI WICAKRYANA	1	D	40	1												
42	17	11	2012	SD S SARASWATI	BURHYA ANDRI WICAKRYANA	1	D	40	1												
43	21	11	2012	SD S SARASWATI	TEJAK WIRANA MADE	1	D	40	1												
44	17	11	2012	SD S SARASWATI	TRIBUUNAWANINGRAHA ADI	1	D	40	1												
45	25	11	2012	SD S SARASWATI	CHRENA ANDHYA P.	1	A	9													
46	25	11	2012	SD S SARASWATI	CHRENA ANDHYA P.	1	B	19	1												
47	2	1	2013	SD S SARASWATI	PRYO PERMANA PUTRA	1	D	29													
48	2	1	2013	SD S SARASWATI	PRYO PERMANA PUTRA	1	D	29													
49	3	1	2013	SD S SARASWATI	WEDANTHA WINCORA	1	A	38													
50	3	1	2013	SD S SARASWATI	WEDANTHA WINCORA	1	A	38													
51	6	1	2013	SD S SARASWATI	ANGGA ANJ ANGGAS	1	A	9	1												
52	6	1	2013	SD S SARASWATI	ANGGA ANJ ANGGAS	1	A	9													
53	6	1	2013	SD S SARASWATI	ANGGA ANJ ANGGAS	1	A	9													
54	6	1	2013	SD S SARASWATI	ANGGA ANJ ANGGAS	1	A	9													
55	6	1	2013	SD S SARASWATI	DANI KUSUMA IB	1	A	13	1												
56	6	1	2013	SD S SARASWATI	DANI KUSUMA IB	1	A	14													
57	7	1	2013	SD S SARASWATI	ANDRI NI PUTU	1	A	1													
58	7	1	2013	SD S SARASWATI	ANDRI NI PUTU	1	A	1													
59	8	1	2013	SD S SARASWATI	DESIK ALYA DAMASTHA	1	A	13													
60	8	1	2013	SD S SARASWATI	DANI APRIGANI NE KADEK	1	A	13	1												
61	8	1	2013	SD S SARASWATI	DANI APRIGANI NE KADEK	1	A	13													
62	8	1	2013	SD S SARASWATI	DANI APRIGANI NE KADEK	1	A	13													
63	8	1	2013	SD S SARASWATI	DANI APRIGANI NE KADEK	1	A	13													
64	10	1	2013	SD S SARASWATI	KHRENA HENDRA PR	1	A	23	1												
65	10	1	2013	SD S SARASWATI	KHRENA HENDRA PR	1	A	23													
66	5	1	2013	SD S SARASWATI	RACHA VALINI NE KOMI	1	A	29	1												
67	5	1	2013	SD S SARASWATI	RACHA VALINI NE KOMI	1	A	29													
68	5	1	2013	SD S SARASWATI	RACHA VALINI NE KOMI	1	A	29													
69	5	1	2013	SD S SARASWATI	RACHA VALINI NE KOMI	1	A	29													

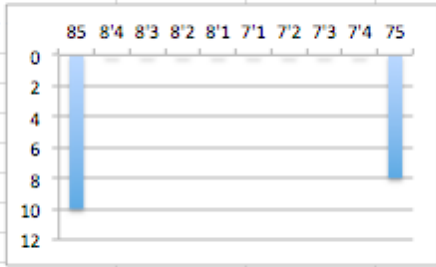
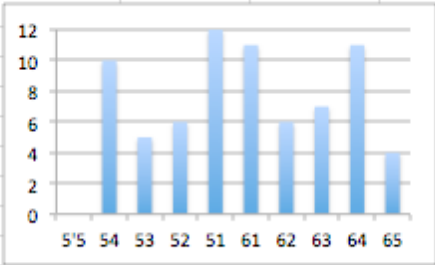
Fig. 53 Interventions sheet to be filled

RESUME SHEET

Show INTERVENTION result in the running period.



	TEETH TREATED	
6		
7		5'5 0
8	█	54 10
9	█	53 5
0	█	52 6
1	█	51 12
2	█	61 11
3	█	62 6
4	█	63 7
5	█	64 11
6	█	65 4
7	█	85 10
8		8'4 0
9		8'3 0
0		8'2 0
1		8'1 0
2		7'1 0
3		7'2 0
4		7'3 0
5		7'4 0
6	█	75 8
7	█	0



DENTOGRAM DECIDUOUS TEETH TREATED

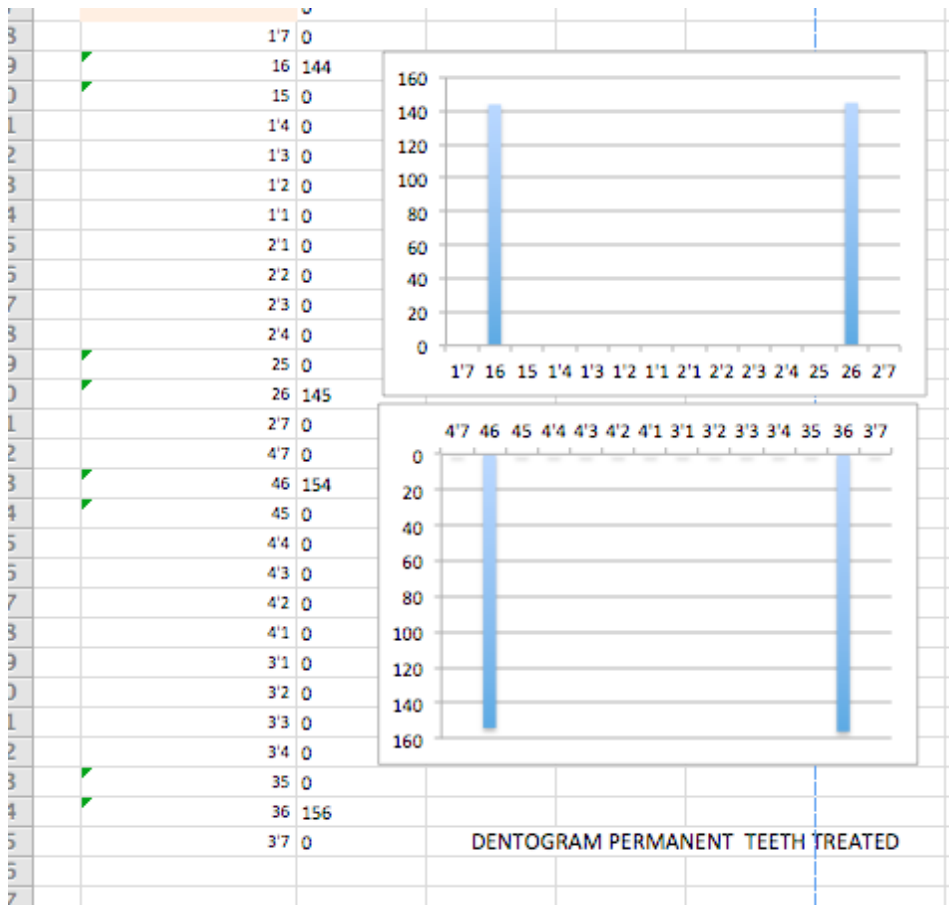


Fig. 54 Resume sheet: statistic result of interventions

