



# take control of your practice

## B.C.-based firm is bringing doctors' offices into the computer age

By Corey Van't Haaff

**I**n 1991, Dr. Brendan Byrne was a busy locum for family physicians. And he saw something that disturbed him. He saw chart after chart filled with information that was either indecipherable or underused.

"An astonishing amount of time and money in medicine [was used to] gather information then put it in a file folder with illegible handwriting. Information was hard to find," he says. He saw what information technology professionals were doing in other industries – using software to make workplaces function better. "It didn't make any sense that we were not doing it in medicine."

Doctors were gathering information in a written form which didn't allow for easy follow-up. Diabetics, for example, weren't up-to-date with blood analysis. There was nothing in the file to prompt the timely ordering of tests.

Then, as luck would have it, Dr. Byrne bought a small medical practice with colleague Dr. Michael Paletta. Being young and naïve, says Byrne, he and his partner decided to build their own software which would eliminate the problems associated with paper charts.

"It was a very old practice. The idea was to build a prototype within a practice," he says. "One interesting thing we learned is that a practice is a small business and we needed, right away, tools that would allow work to flow more efficiently."

Those tools included a referral mechanism, telephone prescriptions, inter-office messaging, follow-up reminders, and electronic lab results. Those things, he says,

are the types of tools that allow a physician to practise medicine more effectively.

In 1998, the doctors took their system on the road, setting up a beta test at the Gain Medical Clinic in Coquitlam. In the first six months of the next year, they installed their software in five clinics. In the following six months, they met their goal of having their system used by 15 practices. Then they added multi-doctor clinics and specialists. By January 2000, they were fully marketing their system.

Today, 225 clinics in B.C., Alberta, Ontario and New Brunswick use Wolf Medical Systems. With a goal to be the foremost physician-led electronic record management (EMR) company in Canada, there's plenty of room for them to expand.

"Only seven per cent of physicians use these systems," says Dr. Byrne. "One of the big things we try to do is educate the market, not bang the competition over the head. The return on investment



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for the physician is tremendous.”

With a total cost of \$4,000 to \$7,000 per physician per year, doctors can be decked out with a total solution, including both hardware and software.

The Wolf Medical System basically allows physicians to transform their offices into paperless places. Billing and scheduling are done electronically, visit notes are maintained on a computer, and lab and radiology reports are processed electronically.

“Electronic records go way beyond what paper can do,” he explains. “For example, we can count the number of diabetics in the office, the number of sub-optimal blood tests. Really, with paper, we wouldn’t be able to answer that.”

Chronic disease management for most family physicians is a time mag-

net. Doctors may know their patients well but not their practices. By improving the way they practise, doctors can improve patient care.

“There’s no more hunting through charts to find information on a disease. We pull all that information onto a structured template. Take a patient with heart disease,” he says. “With our tool, when you put information in about a visit, for example blood pressure, it calculates the risk of a cardiac event in the next ten years based on the Framingham study. This patient has X risk and the average risk is X. The system does it for you, you don’t need to think. It tells you what you’re not aware of or prompts you if a test is missing.”

It was the opportunity to better manage patient care that attracted Dr. Tom Bailey, a family physician in Victoria, to Wolf Medical Systems. “There are a whole lot of things you can do by storing records on a database,” says Dr. Bailey. “An electronic database allows you to find all patients with a certain condition in order to better manage their care.”

He cites the recent withdrawal of the drug Vioxx as an example.

“I could tell in 15 seconds all the patients I ever prescribed Vioxx for,” he says.

It’s this type of comprehensive patient management that Dr. Bailey loves.

“There’s better communication between office staff and doctors back and forth,” says Dr. Bailey. “When we used to order a test and create a paper trail, things got lost. With an electronic system, the receptionist can bring up a patient and say what the status is.”

Although he is a fan of the Wolf sys-

tem, its initial introduction to his practice wasn’t painless. “Everyone had a different type of passion for going this route,” he explains. “Initially, there was cussing the first few weeks but once the information was there [in the computer], there were significant improvements in terms of doing things. No one would go back.”

He says he chose Wolf because it appeared to work best in the context of a doctor’s office. “It worked intuitively; it worked the way one would normally work in the office,” he says.

He also says he spends less time doing paperwork. “I feel much more in control in my practice. I know where I am in terms of workload,” he says. “I go home much earlier and work from home. I’ve done stuff with lab work that is only hours old. I know when I go home, I’ve done it all; I’m up-to-date. It was never like that with paper.”

Dr. Bailey figures the Wolf Medical System allows him to see two to three more patients a day without spending more time at the office. But Dr. Byrne is quick to say that the Wolf system doesn’t practise medicine, however. He thinks doctors do a pretty good job at making decisions. His system simply provides the right information, right now. And it also provides timely information about a patient regardless of the complaint that brings the patient in at any given time.

“Someone comes in with a sprained ankle who is on high cholesterol medicine,” he says. “Has she had blood tests to check for liver damage? Our system prompts you that the test is missing. It may not be the issue that is bringing the patient in.”

For Dr. Helen Chen, a family physician in Vancouver, the decision to go paperless – and go with Wolf – was easy.

*Continued on page 47*



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Overall adverse experiences with $\geq 3\%$ incidence in controlled clinical trials with ADVAIR <sup>®</sup> DISKUS <sup>®</sup> in patients with COPD						
Adverse events	ADVAIR <sup>®</sup> DISKUS <sup>®</sup> 50/500mcg (n = 168)	ADVAIR <sup>®</sup> DISKUS <sup>®</sup> 50/250mcg (n = 178)	Fluticasone propionate 500mcg (n = 391)	Fluticasone propionate 250mcg (n = 399)	Salmeterol 50mcg (n = 341)	Placebo (n = 576)
Any event	78	70	80	74	68	69
Gastrointestinal						
Nausea & vomiting	4	2	4	4	3	3
Non-site specific						
Fever	4	4	3	3	1	3
Musculoskeletal						
Malaise & fatigue	4	3	3	3	2	3
Muscle cramps & spasms	8	3	2	2	3	1
Muscle pain	4	0	3	2	1	<1
Musculoskeletal pain	12	9	9	10	12	10

<sup>†</sup>Other adverse events that occurred in the groups receiving ADVAIR<sup>®</sup> DISKUS<sup>®</sup> in these studies with an incidence of 1% to 3% and that occurred at a greater incidence than with placebo were: hypertension, syncope, palpitations, arrhythmias, fractures, postoperative complications, soft tissue injuries, contusions and hematomas, wounds and lacerations, rhinorrhea/post nasal drip, ear signs and symptoms, epistaxis, nasal sinus disorders, pharyngitis/throat infections, ear/nose/throat infections, ear/nose/throat signs and symptoms, laryngitis, diabetes mellitus, hypothyroidism, visual disturbances, lacrimal disorders, dry eyes, eye infections, ocular pressure disorders, dyspeptic symptoms, hyposalivation, constipation, dental discomfort and pain, gastrointestinal infections, regurgitation and reflux, gum signs and symptoms, oral discomfort and pain, oral lesions, diverticulosis, abnormal liver function tests, breathing disorders, lower respiratory signs and symptoms, sputum abnormalities, pneumonia, lower respiratory hemorrhage, bronchitis, bone and skeletal pain, sleep disorders, tremors, vertigo, non-site specific pain, oedema and swelling, viral infections, candidiasis unspecified site, nonspecific conditions, bacterial infections, anxiety, situational disorders, skin infections and fungal skin infections.

After 52 weeks of treatment with ADVAIR<sup>®</sup> DISKUS<sup>®</sup> (50/500 mcg), fluticasone propionate 500 mcg, salmeterol 50 mcg and placebo in 1465 patients with COPD, the most commonly reported drug related adverse event was candidiasis of the mouth and throat (ADVAIR<sup>®</sup> DISKUS<sup>®</sup> 50/500 mcg, 6%; fluticasone propionate 500 mcg, 6%; salmeterol 50 mcg, 1%; placebo, 1%).

#### Postmarketing Reports

There have been uncommon reports of cutaneous hypersensitivity reactions. There have also been rare reports of hypersensitivity reactions manifesting as angioedema (mainly facial and oropharyngeal oedema), respiratory symptoms (dyspnea and/or bronchospasm) and very rarely, anaphylactic reactions.

#### SYMPTOMS AND TREATMENT OF OVERDOSAGE

There are no data available from clinical trials on overdose with ADVAIR<sup>®</sup> (salmeterol xinafoate/fluticasone propionate), however data on overdose with individual drugs is given below.

The signs and symptoms of salmeterol overdose are: tremor, headache, tachycardia, cardiac arrhythmias, hypokalemia, hypertension and, in extreme cases, sudden death. Treatment should be symptomatic; cardiac and respiratory function should be monitored and support provided if necessary. The preferred antidote is the judicious use of a cardioselective  $\beta$ -blocking agent. Cardioselective  $\beta$ -blocking drugs should be used with caution, bearing in mind the danger of inducing an asthmatic attack. Serum potassium level should be monitored. If ADVAIR<sup>®</sup> therapy has to be withdrawn due to overdose of the  $\beta$ -agonist component of the drug, provision of appropriate replacement steroid therapy should be considered.

Acute inhalation of fluticasone propionate doses in excess of those approved may lead to temporary suppression of the hypothalamic-pituitary-adrenal axis. This does not usually require emergency action, as normal adrenal function typically recovers within a few days.

If higher than approved doses are continued over prolonged periods, significant adrenocortical suppression is possible. There have been very rare reports of acute adrenal crisis occurring in children exposed to higher than approved dosages (typically 1000mcg daily and above), over prolonged periods (several months or years); observed features included hypoglycemia and sequelae of decreased consciousness and/or convulsions. Situations which would potentially trigger acute adrenal crisis include exposure to trauma, surgery or infection or any rapid reduction in dosage. Patients receiving higher than approved dosages should be managed closely and the dose reduced gradually.

#### DOSAGE AND ADMINISTRATION

ADVAIR<sup>®</sup> (salmeterol xinafoate/fluticasone propionate) should not be used to treat acute symptoms of asthma or COPD. It is crucial to inform patients of this. For asthma, a short-acting  $\beta_2$ -agonist should be prescribed for this purpose. Medical attention should be sought if patients find that short-acting relief bronchodilator treatment becomes less effective or if they need more inhalations than usual. Sudden worsening of symptoms may require increased corticosteroid dosage which should be administered under medical supervision. As twice-daily regular treatment, ADVAIR<sup>®</sup> provides twenty-four hour bronchodilation and can replace regular use of a fast-acting, short duration (4 hour) inhaled or oral bronchodilator (e.g., salbutamol). Short-acting  $\beta_2$ -agonists should be used only to relieve acute symptoms of asthma (see PRECAUTIONS). Patients should be regularly reassessed so that the strength of ADVAIR<sup>®</sup> they are receiving remains optimal and is only changed on medical advice. The dose should be titrated to the lowest dose of fluticasone propionate at which effective control of symptoms is maintained. The patient should be made aware that for optimum benefit ADVAIR<sup>®</sup> should be taken regularly, even when asymptomatic.

As a general rule, rinsing the mouth and gargling with water after each inhalation can help in preventing the occurrence of candidiasis. Cleansing dentures has the same effect.

ADVAIR<sup>®</sup> is to be administered by oral inhalation only.

#### RECOMMENDED DOSAGE: ASTHMA - ADVAIR<sup>®</sup> DISKUS<sup>®</sup>

**Adults and adolescents 12 years of age and older:** One inhalation ADVAIR<sup>®</sup> 100 DISKUS<sup>®</sup> (50 mcg salmeterol and 100 mcg fluticasone propionate) twice daily. **or** One inhalation ADVAIR<sup>®</sup> 250 DISKUS<sup>®</sup> (50 mcg salmeterol and 250 mcg fluticasone propionate) twice daily. **or** One inhalation ADVAIR<sup>®</sup> 500 DISKUS<sup>®</sup> (50 mcg salmeterol and 500 mcg fluticasone propionate) twice daily.

**Children (4-11 years of age):** One inhalation ADVAIR<sup>®</sup> 100 DISKUS<sup>®</sup> (50 mcg salmeterol and 100 mcg fluticasone propionate) twice daily. At present, there are insufficient clinical data to recommend the use of ADVAIR<sup>®</sup> DISKUS<sup>®</sup> in children younger than 4 years of age.

#### RECOMMENDED DOSAGE: ASTHMA - ADVAIR<sup>®</sup> Inhalation Aerosol

**Adults and adolescents 12 years and older:** Two inhalations ADVAIR<sup>®</sup> 125 inhalation aerosol (25 mcg salmeterol and 125 mcg fluticasone propionate) twice daily. **or** Two inhalations ADVAIR<sup>®</sup> 250 inhalation aerosol (25 mcg salmeterol and 250 mcg fluticasone propionate) twice daily. At present, there are insufficient clinical data to recommend the use of ADVAIR<sup>®</sup> inhalation aerosol in children younger than 12 years of age.

#### RECOMMENDED DOSAGE: COPD - ADVAIR<sup>®</sup> DISKUS<sup>®</sup>

**Adults (18 years and older):** One inhalation ADVAIR<sup>®</sup> 250 DISKUS<sup>®</sup> (50 mcg salmeterol and 250 mcg fluticasone propionate) twice daily. **or** One inhalation ADVAIR<sup>®</sup> 500 DISKUS<sup>®</sup> (50 mcg salmeterol and 500 mcg

fluticasone propionate) twice daily.

**Elderly and patients with impaired renal or hepatic function:** There is no need to adjust the dose in the otherwise healthy elderly or in patients with impaired renal function (see PRECAUTIONS, Drug Interactions). Because salmeterol is predominantly cleared by hepatic metabolism, patients with hepatic disease should be closely monitored.

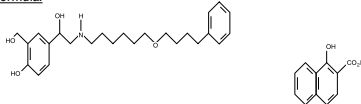
#### PHARMACEUTICAL INFORMATION

##### Drug Substance

**Proper Name:** salmeterol xinafoate

**Chemical Name:** 4-hydroxy- $\alpha$ -[[(6-(4-phenylbutoxy)hexyl)amino]-methyl]-1,3-benzenedimethanol, 1-hydroxy-2-naphthoate

##### Structural Formula:



**Molecular Formula:** C<sub>23</sub>H<sub>27</sub>NO<sub>4</sub> • C<sub>11</sub>H<sub>7</sub>O<sub>2</sub>

**Molecular Weight:** 603.8

**Description:** White to off-white crystalline powder with a melting point ~ 123°C

**Solubility:** In water ~ 0.07 mg/mL (pH = 8)

In saline ~ 0.08 mg/mL (0.9% w/v)

In methanol ~ 40 mg/mL

In ethanol ~ 7 mg/mL

In chloroform ~ 3 mg/mL

In isopropanol ~ 2 mg/mL

**pKa and pH:** Salmeterol is amphoteric and is partially ionised in water over the whole pH range. The ionised species have a low solubility, thus accurate determination of the two macro-dissociation constants by potentiometric titration has not been possible. The apparent pKa for dissociation of the phenolic group (as determined by ultraviolet spectrophotometry) is 9.3. The four microconstants lie between 8.9 and 9.7. The pH of a saturated aqueous solution of salmeterol xinafoate (0.07 mg/mL) is about 8.

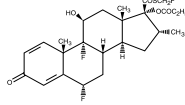
**Partition Coefficient:** The partition coefficient between n-octanol and water is pH dependent and has been determined by an HPLC procedure. log D = 3.2 (pH 9.2), log D = 2.0 (pH 7.4), log D = 0.6 (pH 4.0)

##### Drug Substance

**Proper Name:** fluticasone propionate

**Chemical Name:** s-fluoromethyl 6 $\alpha$ , 9 $\alpha$ -difluoro-11 $\beta$ -hydroxy-16 $\alpha$ -methyl-3-oxo-17 $\alpha$ -propionyloxyandrost-1,4-diene-17 $\beta$ -carboate

##### Structural Formula:



**Molecular Formula:** C<sub>25</sub>H<sub>37</sub>F<sub>3</sub>O<sub>5</sub>S

**Molecular Weight:** 500.6

**Description:** Fluticasone propionate is a white to off-white powder. It is freely soluble in dimethyl sulfoxide and dimethylformamide, sparingly soluble in acetone, dichloromethane, ethyl acetate and chloroform, slightly soluble in methanol and 95% ethanol, and practically insoluble in water. Fluticasone propionate decomposes without melting. Onset of decomposition occurs at about 225°C.

##### Composition

ADVAIR<sup>®</sup> DISKUS<sup>®</sup> is a dry powder inhalation device that delivers 50 mcg of salmeterol, and 100, 250 or 500 mcg of fluticasone propionate per inhalation. Also contains lactose (which contains milk protein). ADVAIR<sup>®</sup> inhalation aerosol comprises a suspension of salmeterol and fluticasone propionate in the propellant HFA-134a (1,1,1,2-tetrafluoroethane). It contains no excipients. ADVAIR<sup>®</sup> inhalation aerosol delivers 25 mcg of salmeterol and 125 or 250 mcg of fluticasone propionate per actuation. This product does not contain chlorofluorocarbons (CFCs) as the propellant.

##### Stability and Storage Recommendations

**ADVAIR<sup>®</sup> DISKUS<sup>®</sup>:** Do not store ADVAIR<sup>®</sup> DISKUS<sup>®</sup> above 30°C. Keep in a dry place. **ADVAIR<sup>®</sup> Inhalation Aerosol:** Store ADVAIR<sup>®</sup> inhalation aerosol between 15°C and 25°C. Protect from frost and direct sunlight. Contents under pressure. Container may explode if heated. Do not place in hot water or near radiators, stoves, or other sources of heat. Even when apparently empty, do not puncture or incinerate container or store at temperatures over 25°C. As with most inhaled medications in pressurized canisters, the therapeutic effect of this medication may decrease when the canister is cold.

#### AVAILABILITY OF DOSAGE FORMS

**ADVAIR<sup>®</sup> DISKUS<sup>®</sup>** is a plastic inhaler device containing a foil strip with 28 or 60 blisters. Each blister contains 50 mcg of salmeterol (as the xinafoate salt) and 100, 250 or 500 mcg of fluticasone propionate as active ingredients. It also contains lactose (milk sugar), including milk protein, which acts as the 'carrier'.

**ADVAIR<sup>®</sup> Inhalation Aerosol** is a pressurized metered-dose inhaler (MDI) consisting of an aluminum canister fitted with a metering valve. Each canister is fitted into the supplied purple actuator/adaptor. A strapac is fitted over the actuator's mouthpiece when not in use. ADVAIR<sup>®</sup> inhalation aerosol is available in two strengths: ADVAIR<sup>®</sup> 125 (25 mcg salmeterol and 125 mcg fluticasone propionate), and ADVAIR<sup>®</sup> 250 (25 mcg salmeterol and 250 mcg fluticasone propionate). Available in 120 dose formats.

**Product Monograph Available Upon Request.**

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GlaxoSmithKline

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## TECHNOLOGY

Continued from page 35

"We were starting from scratch. We had no old charts to bring over," she says. "It was the perfect opportunity. We had used Wolf before and were familiar with it. We looked into one or two more but Wolf seemed to be the easiest to use and had a good support system for users."

She describes the investment in buying both hardware and software as great, but says the benefits were substantial. In addition to saving room on chart storage, Dr. Chen saves money on staff.

"We have two and a half doctors working in our office and we manage with one and a half MOAs."

She adds that communication with other doctors and with reception is more convenient with computers.

"The office looks neater without files all over," says Dr. Chen. "With Wolf, it's almost like an email messaging system. You don't need to pull the chart and I have access to the whole file."

A huge benefit was the ability to use the system from home through the Internet. That means the laptop that Dr. Chen carries from exam room to exam room can stay at the office and she logs on through her home computer if she needs to access a file. And when she does bring her computer into patient meetings, they are pretty accepting. "The first patients were very surprised. Their only worry was about lost data but once I explained how the system works, they were generally quite happy and impressed," she says.

The big difference between his system and competitors, says Dr. Byrne, is that it is physician-designed and very intuitive, especially in both the clinical and the workflow contexts.

"When you pull up a template, it's designed in such a way as to prompt you and pull data to help you," he explains. "The system is very structured with a medication list and a problem list. There's a built-in drug interaction model."

And helping other doctors, ultimately, is what drove Dr. Byrne to create the Wolf Medical System.

"I had a passion for getting the right information to physicians," he says. "What we contribute can improve patient care."

Freelance writer Corey Van't Haaff is Just For BC Doctors' technology columnist.